2007 ACCOMPLISHMENT REPORT
&
2008
SOUTH END COMPLEX
&
BASQUE WELLS & CRATERS FIRES
PROPOSED
BURNED AREA REHABILITATION PLAN

UNIT: US Fish and Wildlife Service
Malheur National Wildlife Refuge

LOCATION: Princeton, Harney County, Oregon

DATE: September 6, 2007

PREPARED BY: Edward Gheen
Implementation Leader

Submitted By: Edward C. Gheen Date: 8/28/07
Title (Burned Area Rehabilitation Team Leader.)

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SOUTH BANK, MUD CREEK, 2006 GRANDAD BURN

EXECUTIVE SUMMARY

Introduction

This Rehabilitation Plan has been prepared in accordance with Department of the Interior and U.S. Fish and Wildlife Service policy. This plan provides rehabilitation recommendations for all lands burned within the South End Complex & Basque Wells & Craters Fire perimeter and downstream impact areas including: public lands administered by the U.S. Fish and Wildlife Service and other

jurisdictions if necessary. The primary objectives of the South End Complex & Basque Wells & Craters Fire Rehabilitation Plan are:

- To repair or improve lands unlikely to recover naturally from severe wildland fire damage by emulating historic or pre-fire ecosystem structure, function, diversity, and dynamics according to approved land management plans.

- Restore or establish healthy, stable ecosystems, even if these ecosystems cannot fully emulate historic or pre-fire conditions as specified in approved land management plans (native vegetative sites, riparian systems, unique environments/habitats, special wildlife use areas).

- Repair or replace fire damaged operating facilities (e.g., Refuge infrastructures, interpretive signs and exhibits, shade shelters, fences, road culverts, etc.)

Fire Background Information

The South End Complex and Basque Wells and Craters Fires began on August 21 and 22, 2006 and grew rapidly in size. While lightning ignited portions of the complex an arson investigation is currently on-going for parts of the Grandad and Krumbo Butte Fires. Extreme fire behavior with rapid rate of spread and high flame lengths were observed during the initial burning periods. The fire burned primarily in three Great Basin fuel models including annual and perennial grasses (Fuel Model 1), sagebrush (Fuel Model 2), and to a limited degree in aspen/mountain shrub (Fuel Model 8/5) There were stringers of large juniper and aspen scattered across the upper portions of the complex that supported fire spread and occasionally torched out. The fires burned a total of 135,009 acres between the elevations of 4,140 and 8,371 feet, all within Harney County, Oregon. On the Malheur National Wildlife Refuge 4,149 acres burned. A Type I Incident Management Team California Interagency IMT 4 was deployed on August 22, 2006. The fires within the complex were contained on September 1, 2006.

The Department of the Interior National Burned Area Emergency Response (BAER) Team conducted an analysis of fire effects using aerial and ground reconnaissance methods throughout the fire area. The watershed group, composed of four hydrologists and a soil scientist, assessed and mapped the overall fire impacts on watershed conditions and developed a soil burn severity map. Two vegetation and range specialists worked with local BLM and Malheur National Wildlife Refuge vegetation, range, and forestry specialists to evaluate and assess fire effects impacts to vegetation resources, including identification of noxious invasive weed populations and fire induced vegetation mortality. An archeologist inventoried wildland fire suppression impacts and fire effects to known culturally significant sites to determine if these sites require stabilization treatments to prevent further damage or loss. The archeologist initiated consultations with the Oregon State Historic Preservation Officer and Tribes associated with the South End Complex and Basque Well and Craters Fires.

The wildlife biologists in coordination with BLM and U.S. Fish and Wildlife Service wildlife biologists conducted an assessment of fire effects to Federal Threatened and Endangered (T&E) wildlife and state protected species and their associated habitat. The biologists also evaluated suppression impacts to wildlife species and initiated emergency Section 7 consultation with the U.S. Fish and Wildlife Service, Bend Field Office. The Team Geographic Information System (GIS) specialists gathered data layers necessary for the plan, coordinated GIS activities, processed data calculations for other resource

specialists, and produced maps for the BAER Plan and presentations. Resource assessments produced by these specialists can be found in Appendix III and individual treatment specifications identified in the resource assessments and proposed for emergency stabilization funding are located in Part I, Treatment Specifications. A summary of proposed FY 2008 treatment costs can be found in Part H Cost Summary Table. An Approval Page for the U.S Fish and Wildlife Service is provided as a signature page for agency review and approval.

PART A - FIRE LOCATION AND BACKGROUND INFORMATION

Fire Name	South End Complex & Basque Wells & Craters Fire
Fire Number	OR-BUD-2494, 2501, 2506,2531
Agency Unit	US Fish and Wildlife Service
Region	R1 Regional Office
State	Oregon
County(s)	Harney
Ignition Date/Cause	08/2102006 Dry lightning/Pending Investigation
Zone	Malheur Wildlife Refuge
Date Fully Contained	08/24-09/24/2006
Jurisdiction	MNR 4,149 Acres

PART B - NATURE OF PLAN

Type of Action (check one box below)

	Initial Submission
XX	Amendment to Initial Submission

PART C - REHABILITATION ASSESSMENT

Rehabilitation Objectives

- Replace infrastructure facilities destroyed/damaged by fire.
- Protect Federal Candidate and State Sensitive species.
- Restore critical stream and riparian habitat.
- Prevent the establishment of non-native invasive plants within burned area boundaries.
- Protect Cultural Resources

TREATMENTS

FY 2007 stabilization treatments included the following activities:

1. Funding of an Implementation Leader and associated personnel to oversee implementation of the South End Complex ES Plan.
2. Drill/seed 107 acres in the Grandad burn area (GPS seeding at 69 acres).
3. Monitor 69-acre seeding and designated noxious weed areas.
4. Control invasive weeds via a herbicide treatment contract.
5. Conduct noxious weed detection on fire disturbed areas.
6. Repair damaged refuge boundary fence via contract.
7. Construct a temporary passage protective fence via contract.
8. Assessment of known Cultural Resource sites from fire damage.
9. Patrol and monitor known Cultural Sites.
10. Perform Native American Consultation on Cultural Resources.
11. Replace fire damaged refuge protection signs.
12. Inspect/repair instream structures and fish screens.
13. Cultural Resource Protection, clearances on Emergency Stabilization Projects.

PART D - TEAM ORGANIZATION, MEMBERS, AND RESOURCE ADVISORS

Burned Area Rehabilitation/Restoration Team Members:

Position	Team Member (Agency)
Implementation Leader	Edward Gheen (FWS)
Fire Management Officer	Shane Theall (FWS)
Refuge Manager	Donna Stovall (FWS)
Deputy Refuge Manager	Chad Karges (FWS)
Public Information	Carey Goss (FWS)
Administrative officer	Tami Coe (FWS)
Operations/Maintenance	Tom Downs (FWS)
NEPA Compliance & Planning	Carla Burnside (FWS) / Edward Gheen (FWS)
Hydrologist/Wetland Plant Ecologist	J.Chris Hoag (NRCS)
Soil Scientist	Pam Keller, Soil Scientist/GIS Specialist (BLM)
Cultural Resources/Archeologist	Carla Burnside (FWS)
Vegetation Specialist	Jess Wenick (FWS)
Wildlife Biologist	Rick Roy (FWS)
GIS Specialist	Louise Zeringue/Wesley Abplanalp (FWS)
Biological Science Technician	Wesley Abplanalp (FWS)
Buena Vista Maintenance	Andy Renc
P Ranch Maintenance	Bill Modey
Documentation/Computer Specialist	Edward Gheen/Louise Zeringue (FWS)
Photographer	Edward Gheen

PART E – FY 2007 FINDINGS AND RECOMMENDATIONS

First Year Monitoring ESR Implementation
South End Complex
&
Basque Wells & Craters Fire

Malheur National Wildlife Refuge

August 30, 2007

BRIDGE CREEK BURN, AUGUST, 2006
PHOTO, APRIL 5, 2007

LIST OF ACTIVITIES, 2007

1. Edward Gheen began work on March 05, 2007 as the Implementation Leader, Louise Zeringue was onboard on April 16, 2007 as the GS-7 Biologist Aide, and Wesley Abplanalp as of July 8, 2007 as the GS-5 Biologist Technician.
2. The 69 acre seeding (107 acre in plan) in the Grandad burn area was completed by BLM in October, 2006.
3. Monitoring of the 69 acre seeding and weed control areas began in June 2007 and was completed on August 20, 2007.
4. The Noxious weed control contract was awarded April 9, 2007. Treatment was completed for the Grandad burn area on August 20, 2007; Craters area on August 25, 2007, and Basque Wells on August 27, 2007.
5. Noxious weed areas scheduled for herbicide treatment and monitoring were selected using GPS and mapping tools.
6. Fence contract was awarded on March 9, 2007. The boundary fence repairs for the Grandad/Craters/Basque Wells burns were inspected and completed on May 2, 2007.
7. The temporary protection fence contract was awarded March 9, 2007. Construction was inspected and completed on June 20, 2007.
8. Assessment of fire damage to 40 Cultural Resource sites began in March 2007, and was completed June 15, 2007.
9. Patrol and monitor known Cultural Sites began June 2007 and was completed on August 21, 2007.
10. Native America Consultation with the Burns Paiute Tribe was accomplished April, 2007.
11. Replacement of 50 fire damaged Refuge Protection signs was completed on August 15, 2007.
12. Cleaning and repair of 25 instream structures completed June 2007.
13. Cultural clearances for 2 projects were completed by Carla Burnside, Archaeologist in June 2006 (seeding), and Feburary 2007 (fence).

1-5. Monitoring of Seeding and Noxious Weed Control, Malheur Wildlife Refuge

A Monitoring Plan for the Malheur National Wildlife Refuge burn areas was developed in March 2007. Monitoring of burn areas to be treated for noxious weeds was initiated after spring growth and completed in August 2007. A total of 2,204 acres of noxious weeds areas were identified and GPS measured. The purpose of monitoring was to measure effectiveness of the noxious weed spray contract and proposed future (FY 2008) seeding and erosion/noxious weed control measures.

Sampled areas were selected to represent noxious weed infestations. Not all burned areas have experienced high levels of infestations, however the potential is there as long as the seed source remains in those infested areas (refer to individual maps outlining weed infestation areas, Appendix I).

Methods

Monitoring was accomplished by August 20, 2007. Three Quadrat-Frequency transects (Craters Burn-1, Grandad Burn/seeding-2,) and six Photo Plot transects (Craters Burn-4, Grandad Burn-2) were installed.

A total of 100 Quadrat plots per transect located in key areas @ 3 each or 300 and six Photo Plots using 9 - 1/16 sq ft measurements or 144 measurements per plot gave acceptable statistical coverage for monitoring the burn areas and relative success of noxious weed control. Photo Plot transects were placed at key representative areas. Quadrat Frequency transects were positioned randomly. Vegetative parameters measured were: basal and foliar cover, species composition of re-occurring plants, number of plants per square foot and per acre, average noxious weeds per square foot and per acre. Additional transect information collected included bare ground, rock and litter. Attention was given to active erosion and average ground cover for the area. Ed Gheen, Louise Zeringue and Wesley Abplanalp collected data and made interpretations and completed the monitoring in the two major burn areas on the refuge, Craters and Grandad. Basque Wells was inspected in the spring /summer (2007) and a small area with a scattering of Perennial pepperweed, Canada and Scotch thistle was measured by GPS.

Vegetation / Range Resource / Wildlife Resource Assessments Recommendations from the South End Complex and Basque Wells & Craters Fires Burned Area Emergency Stabilization Plan specified seeding areas experiencing moderate to heavy above ground vegetation mortality. These sites on the refuge, however, were not seeded. A 69-acre (107-acre planned) seeding (2006) in a bench upland field was monitored, as were burned area noxious weed control areas.

Chris Hoag, Wetland Plant Ecologist (NRCS, Aberdeen, Idaho) was asked to assess the fire damage to Mud Creek and give recommendations on restoration methods. Hoag used the Stream Visual Assessment Protocol (SVAP) that was developed by the NRCS (1998). This protocol assesses up to 15 different factors on the stream and gives a repeatable evaluation of its condition. We looked at 12 different factors and rated them. Hoag's evaluation and report is included as an attachment to this document. Mr. Hoag has an exemplary record of applying wetland-riparian principals to environmental problems in the Western United States.

Findings

The following results are an average of three – 100 Quadrat-frequency plot transects (300 plots) using a 100 foot center line with 10 randomly located transects @ 10 plots each, and six Photo Plots using 9 - 1/16 sq ft measurements or 144 measurements per plot (BLM - Rangeland Monitoring - Trend Studies, TR 4400-4).

Table 1. Monitoring Findings for 2007, Noxious Weed Control Burn Areas

Measure	2007	2008
Basal Vegetation Cover Percent	5.16	
Key Species Percent Composition	19.50	
Average Plants per Acre	338,025.00	
Average Plants per Square Foot	7.76	
Average Ground Cover percent (litter)	39.14	
Average Bare Ground Percent	51.00	
Average Litter Percent	37.00	
Average Noxious Weeds per Square Foot	2.86	

Key monitoring findings FY 2007 were:

1. Noxious weed (by species) density before and after treatment ranged from:

   Canadian Thistle - 4 plants per square foot to 3 plants per square foot.

   Perennial Pepperweed – 2 plants per square foot to 0.8 plants per square foot.

   Russian Knapweed – 3 plants per square foot to 3 plants per square Foot (Late treatment, Plan ready to submit, not able to observe spray results).

2. Ground cover (Live Vegetation) increased from 16.9 % to 19.7 %.

3. High priority stream bank erosion (Mud Creek) was recorded in June as 20 banks averaging 51/2 feet tall and 1026 feet in length needing protection.

Discussion

This is what we learned FY 2007 about weed control: Our monitoring has shown that we've not had much of an impact on Canada thistle. Spraying commenced a month later than the contract recommended, due to uncontrollable work delays. We were advised that the chemical Telar should be used on Perennial Pepperweed and Canada Thistle. We've had good results on pepperweed, but minimal results on thistle. After visiting with a chemical company Ed's been advised to use milestone on Canada Thistle. Thistle is still being sprayed (as are the Russian knapweed sites) as this document is ready to be sent to the regional office (August 17, 2007). In other words, we need more contracting options to address the noxious weed problem on this refuge. Our monitoring sites have been located to reflect any changes to frequency and trend of noxious weed occurrence. We are confident that next year we will have a more effective approach in invasive weed control.

Recommendations

Recommendations which will assist in management decisions were made based on the findings of the monitoring. These recommendations are:

A) A seasonal Invasive Weed Control Window to be used at the Malheur National Wildlife Refuge was developed based on past weed control performance.

Canada Thistle: May 15 - July15, especially during rosette stage.

Perennial Pepperweed: EARLY; Pre Bloom stage, 8-10 inches high through flowering stage, normally May 15 - July 30.

Perennial Pepperweed: LATE; Bud stage, late summer-fall, August - October

Russian Knapweed: EARLY; Rosette stage, May 15 - June 1.

Russian Knapweed: LATE; July 15 - August 30 (Burn or Mow off Skeletons).

B) Any use of domestic livestock within the refuge boundaries must be carefully planned to avoid transportation of weed seed into areas presently free of noxious weeds. Interior fences in sensitive areas should be repaired and maintained annually.

Monitoring of Seeded Area in Grandad Burn (107 Acre plan/69 Acre GPS)

Table 2. 2006 Seeded Species, Composition, Grandad Burn, (Seeding in Upland Bench Area)

Seeded Plants	2007 Percent
Bluebunch wheatgrass (Pseudoroegneria spicata)	42.3
Sandberg bluegrass (Poa sandbergii)	48.5
Western yarrow (Achillea millefolium))	3.0
Blue flax (Linum lewissi)	6.1
Total	**100.0**

Table 3. Other Competing Plants In 69 Acre – 2006 Seeding

Other Plants	2007 %Composition
Cheatgrass (Bromus tectorum)	58.3
Squirreltail (Elymus elymoides)	11.9
Clasping pepperweed (Lepidium perfoliatum)	11.9
Sandberg bluegrass (Poa secunda)	2.4
Smallseed falseflax (Camrlina microcarpa)	7.7
Tumble mustard (Sisymbrium altissimum)	6.0
Western salsify (Tragopogon dubius)	0.6
Flixweed (Descurainia Sophia)	0.6
Fiddleneck (Amsinckia intermedia)	0.6
Total	**100.0**

Table 4. Species Composition for 2006 Seeded and Other Plants

Plants	2007 Percent	2008 Percent
Seeded Plants	00.0	
Other Plants	100.0	
Total	**100.0**	

Methods

The 69-acre seeding was completed by BLM on October 6, 2006. The following species and seeding rate was applied:

Bluebunch wheatgrass.....5 Lb/Acre
Sandberg bluegrass.....3 Lb/Acre
Western yarrow.....0.5 Lb/Acre
Blue flax.....0.5 Lb/Acre

Findings

Preliminary evaluation of the Grandad seeding revealed no spring sprouting of seeded species. The Refuge received several spring rains that would have been enough to adequately sprout seed. There was, however, several months of cold temperature with the spring rains and associated soil temperatures that may not have been high enough to germinate seed. Subsequent examinations showed little change in sprouting success. This seeding will be evaluated again next spring.

Noxious Weed Treatment

Invasive weed treatments were initiated in fiscal year 2007. After a spray contract was issued through the refuge, a noxious weed control contractor began in June 20, 2007 spraying Perennial Pepperweed, Canada and Scotch Thistle, Whitetop, and Russian Knapweed in the Craters and Grandad burn areas. Problems with equipment and other delays caused a late start in July. High priority noxious weed treatment areas are identified on GPS maps (Appendix I). Treatments by the contractor and refuge employees continued through August 2007. Combining the three burn areas (Craters/Grandad/Basque Wells), a total of 2204 acres were treated.

Table 5. Noxious Weed Treatment by Burn Area, 2007

Burn Area	High Priority Acres	Date Completed
Grandad	395	August 24
Craters	1,779	August 15
Basque Wells	30	August 27
Totals	**2,204**	**August 27**

6. Boundary Fence Repair, Malheur Wildlife Refuge

Findings

Fire damage occurred along 11.5 miles of boundary fence between the refuge and BLM. Stream crossings on Mud and Bridge Creeks (Grandad Burn) had been cut and removed during fire control activities. Other areas experienced excessive fire heat and the fence needed replacement. The majority of the eastern portion of fence in the Craters Burn needed complete fence replacement.

Table 6. Boundary Fence Repair Completed, 2007

Burn Area	Miles	Completed 2007
Grandad	5.0	April 2
Craters	3.5	April 24
Basque Wells	3.0	May 2
Totals	**11.5**	**May 2**

7. Temporary Passage Protective Fence

Findings

A refuge protective fence was built to allow traditional livestock trailing through the Grandad Burn area. This double fence will prevent cattle from wandering onto refuge lands burned by the South End Complex fires and protect seeded areas and areas managed for natural recovery.

Table 7. Temporary Protective Fence Completed, 2007

Burn Area	Miles	Completed 2007
Grandad	4.75	June 20
Total	**4.75**	**June 20**

Methods

Instructions were given to the contractor on site in the field. Early site visits were made daily. Later, weekly visits were made to assure that construction was progressing as required.

Findings

Construction was accomplished June 20, 2007 as per specifications.

Discussion

Future fencing contracts should include a pre-contract inspection by refuge personnel to determine actual fire damage to provide a more accurate appraisal of needed repairs and associated costs.

8. Assessment of Known Cultural Resource Sites

Thirty-four prehistoric and six historic cultural resource sites were assessed using criteria established by Cultural Resource Specialists on the Department of Interiors Burned Area Emergency Response Team. The criteria includes, but was not limited to burn severity, whether features are present, erosional threats, fire effects and suppression effects. Two sites within the Craters Fire area were impacted by suppression activities and these sites will be monitored for potential erosion. The site areas of all prehistoric sites were determined to be larger than originally mapped as the result of vegetative cover removal. No significant wood elements at historic sites were impacted by the fires.

Table 8. Location and Number of Cultural Sites

Location	Number	Completed 2007
Malheur Refuge	44	June 15

9. Patrol and Monitor Known Cultural Sites

Methods

Cultural resource sites within and adjacent to fires that are at risk of looting and vandalism require monitoring. Louise Zeringue, Ed Gheen, and Wesley Abplanalp patrolled and monitored cultural resource sites on the Malheur Refuge in coordination with Law Enforcement Officer John Megan.

Illegal excavation occurred at one prehistoric site on the Grandad Fire. It is believed that the individuals involved in this illegal activity entered the area from adjacent Bureau of Land Management lands. The damage to the site was documented and law enforcement patrols increased in the area.

10. Native American Consultation

Consultation with Burns Paiute Tribe (Tribe) was not officially instigated until July when a Culture and Heritage Specialist was employed by the Tribe and was available to visit each of the fire areas. The Refuge Archaeologist discussed stabilization plans with members of the Tribal Council on February 1, 2007. On-site consultation included identification of prehistoric sites within each fire area, the results of site assessments, the presence of culturally important plants, and future restoration plans.

11. Replace Fire Damaged Signs

Resource protection signs were damaged as a result of the Craters, Grandad and Basque Wells fires. These signs need to be replaced in order to protect resources from damage associated with unauthorized use.

Table 9. Refuge Protection Signs Replaced

Burn area	Number	Completed 2007
Grandad	20	August 15
Craters	12	July 11
Basque Wells	18	July 18
Total	**50**	**August 15**

12. Cleaning and Repair of Instream Structures, Fish Screens and Other Facilities.

Maintenance crews identified structures needing cleaning and repairs. Twenty five diversion structures and screens were inspected and repaired.

Table 10. Instream Structures Repaired

Burn Area	Number	Completed 2007
Grandad	25	June 15

13. Cultural Clearance for Emergency Stabilization Projects such as Seeding and Fencing.

Cultural resource clearances were conducted for two ground disturbing projects. One hundred and seven acres proposed for reseeding in the Grandad Fire were surveyed in September 2006. Cultural resource sites adjacent to the proposed seeding were identified and flagged for avoidance. An additional 4.75 miles of linear survey was conducted in advance of the installation of temporary fence between Knox Springs and Bridge Creek on the Grandad Fire. Installation of this fence prevented livestock damage to the 107 seeded acres, but also excludes trailing livestock from eleven prehistoric sites burned during the fire, increasing vegetation recovery and lessening the visibility of these sites to potential looting.

Table 11. Cultural Clearance Accomplished

Burn Area	Number	Completed 2006/2007
Grandad	2	2
Craters	0	0
Basque Wells	0	0

PART F. SUMMARY OF WORK COMPLETED AND COSTS, 2007

TREATMENT SPECIFICATIONS	WORK COMPLETED FISCAL YEAR 2007
Specification # 1 Implementation Leader, Admin. Assistant Materials/Supplies/Travel	Funding a Project Leader and assoc. personnel to oversee implementation of the South End Complex ES Plan Personnel/Supplies/Travel Cost: $ 78,664
Specification # 2 Drill/Seed (107) 69 Acres Grandad Burn Area	Seeding was completed by drilling the native mix with a BLM rangeland drill with 1 inch depth bands. Seeding was accomplished by BLM in October, 2006. Personnel/Material Cost: Seed $ 9,211
Specification # 3 Monitor Seeding & Noxious Weeds	Monitored (107) 69 acre seeding (Grandad Burn), and 2515 acres of Noxious Weeds Personnel/Material/Camera Cost: $ 1,416
Specification # 4 Control Invasive Weeds, Chemical Treatment	Contract awarded April 9, 2007. Work began June 19, 2007, and completed September 20, 2007. Total Cost: $ 176,040
Specification # 5 Noxious Weed Detection	Conducted noxious Weed Surveys within burn areas Personnel Cost: $ 12,696
Specification # 6 Boundary Fence Replacement	Contract awarded March 09, 2007. Ed toured fence locations with contractor, inspected 11.5 miles as repairs completed. All boundary fence repairs completed May 7, 2007. Total Cost: $ 67,962
Specification # 7 Temporary Protective Fence	Contract awarded March 09, 2007. Project completed June 20, 2007. 4.75 miles of fence inspected June22, 2007 Total Cost: $ 29,578
Specification # 8 Assessment of known Cultural Resource Sites	Assessment of fire damage to 41 sites commenced March 10, 2007 and was completed June 15, 2007 Personnel Cost: $ 18,685
Specification # 9 Patrol and Monitor Known Cultural Sites	Monitoring commenced June 1, 2007 and was completed on August 21, 2007 by Ed Gheen, Louise Zeringue and Wesley Abplanalp and John Megan, refuge law enforcement Personnel/Material Cost: $ 25,056
Specification # 10 Native American Consultation	Field consultation with the Cultural Resource Program Director for the Burns Paiute Tribe Personnel Cost: $ 2,827
Specification #11 Replace Fire Damaged Refuge Protection Signs	March 2007, Ed ordered 50 Refuge Boundary and 25 Research Natural Area replacement signs. Damaged signs replaced by Wesley and Ed by July 30, 2007. Cost of Replacement Signs: $1,405
Specification # 12 FWS Debris Removal	Maintenance crews inspected and cleaned/repaired 25 instream structures and fish screens. Personnel/Material Cost: $ 22,750
Specification # 13 Cultural Resource Protection – Treatment Clearances - USFWS	Emergency Stabilization Areas designated for seeding (107 acres) and temporary fencing (4.75 miles) were surveyed and cleared by Carla Burnside, Archaeologist on Sept?? 2006. Personnel/Material Cost $ 1,428

Table 12. Comparison of Projected vs. Actual Costs, FY 2007

TREATMENT SPECIFICATION	PROJECTED COST	ACTUAL COST	ACCOUNTING COMMENTS
Specification #1 Implementation Leader, Administration Assistant/Supplies	$ 78,664	$ 78,664	
Specification #2 Drill/Seed (107) 69 Acres Grandad Burn Area	$ 10,121	$ 9,211	$ 910 Savings
Specification # 3 Monitor Seeding and Noxious Weed Control	$ 1,416	$ 1,416	
Specification # 4 Control Invasive Weeds, Chemical Treatment	$ 176,040	$176,040	
Specification # 5 Noxious Weed Detection	$ 12,696	$ 12,696	
Specification # 6 Boundary Fence Replacement	$ 67,962	$ 67,962	
Specification # 7 Temporary Protective Fence	$ 29,578	$29,578	
Specification # 8 Assessment of Known Cultural Resource Sites	$ 18,685	$ 18,685	
Specification # 9 Patrol and Monitor Cultural Sites	$ 25,056	$ 25,056	
Specification # 10 Native American Consultation	$ 2,827	$ 2,827	
Specification # 11 Replace Fire Damaged Refuge Signs/Posts	$ 952	$ 1405	$ - 453 (overrun)
Specification # 12 FWS Debris Removal	$ 22,750	$ 22,750	
Specification # 13 Cultural Resource Protection – Treatment Clearances - USFWS	$ 1,428	$ 1,428	
TOTAL	**$ 448,175**	**$ 447,718**	**$ 457 Remaining**

REHABILITATION TREATMENTS RECOMMENDED FOR FY 2008

This plan addresses the following rehabilitation treatments for FY 2008:

1. Continue treatment of invading noxious weeds in heavily burned locations where the understory/overstory of native grasses, shrubs and trees have been removed and other recorded sites within the burn boundaries. Recommend using Milestone herbicide for Canada thistle and Russian knapweed and using Telar herbicide for perennial pepperweed. Seed heavily burned areas with grasses to control and prevent spreading of remnant noxious weeds.

   The increased presence of communities of noxious weeds are reducing significantly the total shrub, grass, sedge, and forb base of wildlife habitat on the Malheur Refuge. The successional changes in the extent and distribution of noxious weeds which has occurred necessitates an increased management approach. Additional quality control work months for the GS-11/7/5 are required to accomplish this program. Field tours of prospective contractors, contracting coordination and supervision, field inspections and monitoring will add additional field time.

2. Replace ground cover and woody riparian vegetation along Mud and Bridge Creeks that were destroyed by intensive fire occurrence. Install willow brush mats and bundles on identified high erosion priority stream banks in Mud Creek. Replace lost habitat conditions for the Columbia Spotted frog, a Federal Candidate Species, and the Native Redband trout, a State Listed Species of Concern.
   Contracting supervision and day to day rehabilitation field activities will require increased work months for the GS-7/5 Range and Biologist technicians. Field work will involve a multitude of various tasks including hand work and physical labor for plantings, bank preparation, seeding, willow-mat preparation and coordination of all activities of contractors and their workers.

3. Seed severely burned areas (intensive fire occurrence sites to provide ground cover) within the Craters and Grandad burn boundaries.

4. Install additional monitoring sites within riparian/native ecosystems and noxious weed treatment areas to record results of rehabilitation efforts and trend.

5. Identify areas where public access closures may be necessary to protect public safety, natural recovery and active stabilization or rehabilitation treatments.

PART G. PROPOSED CONTINUING ACTIVITIES FOR FY 2008

Many native plant communities in the Malheur Refuge dominated by a shrub overstory experienced severe burns and mortality. With the ever-presence of invasive weeds, the probability of conversion of these areas to invasive annuals and perennials is high. FWS Range and Wildlife personnel recommend seeding of these areas to native species, allowing for future herbicide treatments to control noxious weeds. Noxious weeds present on the refuge include Perennial pepperweed, Whitetop, Russian knapweed, Canada and Scotch thistle.

In August 2006 both Bridge and Mud Creeks (Grandad Fire) experienced severe damage from wild fire. Both creeks have experienced severe grazing pressures in the past and were on an upward recovery. Unfortunately, the fires caused significant damage to the vegetation and recovery on these riparian systems has been set back as a result of direct mortality and destabilization of the stream channels. Intensive fire occurrence over a major portion of Mud Creek (90 %) and portions of Bridge Creek (50 %) removed all ground cover. Root masses have been destroyed reducing their stabilizing influence, leading to bank failure and mass soil movement.

The existing beaver population is also of concern. The fires have drastically reduced the beaver's food resources and the remaining woody vegetation making any new growth at risk of over utilization. The over utilization of this vegetation could further delay the recovery of both systems. Removal of the beavers is not considered a viable option. In the long run, it is believed that beavers will play a major role in reestablishing proper functioning riparian habitats in these systems and aid in developing natural fire breaks.

Both drainages have populations of the Columbian spotted frog, a federal candidate species and Redband trout, a State sensitive species. Further degradation of the riparian habitat reduces the Refuge's ability to manage and recover these species.

The solution to both creeks is to intervene and jump start vegetative recovery and bank stabilization. The first step is to place vertical live willow bundles and mats on those cut banks experiencing erosion. This should be accomplished in late fall or early spring. The willows provide immediate protection through increased roughness, and live cuttings eventually root and provide permanent reinforcement. In addition, juniper branches and stems will be used to increase channel roughness and reduce energy from water during high flows in the primary and secondary channels.

The second step is to plant riparian trees and shrubs native to the area, especially species such as: red osier dogwood; black hawthorn; elderberry; serviceberry; choke cherry; buffalo berry; black cottonwood; aspen; and snow berry. New plantings will be protected from over-utilization with plastic plant protectors and juniper limbs and stems.

Finally exposed open areas above stream banks will be seeded to riparian and upland native species to stabilize and provide competition for invasive noxious weeds. Re-creating and enhancing these riparian corridors will add greatly to the existing wildlife diversity, but these riparian corridors will also be

effective natural fire breaks in the event of another wildfire in the vicinity.

Without this rehabilitation effort, massive siltation of both creeks will occur with disastrous impacts to both redband trout and Columbian spotted frog, not to mention the many associated wildlife species that utilize riparian habitats. Invasion of noxious weeds (Perennial pepperweed, Canada and Scotch thistle) and annual vegetation prone to frequent fire will occur.

The assessment of risk to both Mud and Bridge creek drainages without this restoration effort is further degradation to both stream channel and associated uplands. It is imperative to restore the fish and wildlife quality and productivity of these systems before further damage results.

References:

Hoag, J.C., S.K. Wyman, G. Bentrup, L. Holzworth, D. G. Ogle, J. Carleton, F. Berg, and B. Leinard. 2001. Technical Note 38: Users Guide to the Description, Propagation, and Establishment of Wetland Plant Species and Grasses for Riparian Areas in the Intermountain West. USDA-NRCS, Boise, ID and Bozeman, MT.

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Carlson, J.R., G.L. Conaway, J.L. Gibbs, and J.C. Hoag. 1995. Riparian/Wetland Project Information Series No. 9: Design criteria for revegetation in riparian zones of the intermountain area. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID.

A.L. Hafenrichter, John L. Schwendiman, Harold L. Harris, Robert S. MacLauchlan, and Harold W. Miller, Plant Materials Specialists, Soil Conservation Service.1979. Grasses and Legumes for Soil Conservation in the Pacific Northwest and Great Basin States. Agriculture Handbook 339. USDA-NRCS, Washington, D.C.

Hoag, J.C., F.E. Berg, S.K. Wyman, and R.W. Sampson. 2001. Riparian Planting Zones in the Intermountain West. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID.

Sherrets, H.D. 1987. Vegetation Suitable for Rehabilitating Burned Areas in Southern Idaho. Idaho BLM Technical Bulletin 87-1, USDOI-BLM, Idaho State Office, Boise, ID.

Recommendations

Based on observed weed control for 2007, the following seed mix is recommended for revegetation on the Malheur National Wildlife Refuge.

Table 13. Recommended seed mix for the Malheur National Wildlife Refuge. Upland sites (250 acres)

Species	Pounds PLS	Percent
Great Basin wildrye (Leymus cinereus variety Magnar)	6 lbs./acre	24.0
Western wheatgrass (Pascopyrum smithii variety Rosana)	5 lbs./acre	20.0
Tall wheatgrass (Elytrigia elongata, variety Alkar)	6 lbs./acre	24.0
Tall fescue (Festuca arundinacea, variety Alta)	8 lbs./acre	32.0
Total	**25 lbs./acre**	**100.0**

Seed should be purchased as Pure Live Seed (PLS) to insure that enough viable seed is planted to reach the recommended weights. Seed should be drilled to a depth of one inch wherever possible due to proven success rates.

6. Recommendations

Following the 2007 monitoring, it was recommended that areas adjacent to Mud and Bridge Creek streambanks be seeded to the following species:

Table 14. Recommended seed mix for the Malheur National Wildlife Refuge Stream side sites (20 acres)

Species	Pounds PLS	Percent
Hard fescue (Festuca ovina, variety Durar)	6 lbs./acre	25.0
Streambank wheatgrass (Elymus lanceolatus, var. Sodar	6 lbs./acre	25.0
Canby bluegrass (Poa canbyi, variety Canbar)	4 lbs./acre	17.0
Sheep fescue (Festuca ovina, variety Covar/Durar)	8 lbs./acre	33.0
Total	**24 lbs./acre**	**100.0**

This mixture of seeded grasses will provide competition with noxious weeds for moisture and nutrients during the 2008 growing season and allow for any additional weed control. Continued monitoring of these sites is recommended to determine whether additional work is needed to protect native plants.

Table 15. Recommended Riparian Replacement Species to be Planted in Mud/Bridge Creeks

Species	Number	Percent
Redosier dogwood (Cornus sericea)	70	8
Quaking aspen (Populus tremuloides)	45	5
Chokecherry (Prunus virginiana)	35	4
Golden current (Ribes aureum)	50	6
Willow species (Salix)	70	8
Black hawthorn (Crataegus douglasii)	30	3
Nebraska sedge (Carex nebrascensis)	150	18
Baltic rush (Juncus balticus)	150	18
Three-square bulrush (Scripus pungens)	150	18
American sloughgrass (Beckmannia syzigachne)	100	12
Total	**850**	**100.0**

H. SUMMARY OF PROPOSED ACTIVITIES AND COSTS

Invasive weed control has been a major activity on the Malheur Refuge for the past several years, and it is still a serious problem. There are several factors that contribute to the rapid spread of weeds on the refuge. Invasive weeds have been introduced without accompanying insect pests and fungal diseases needed to keep them under control as occurs in their native country. Also, many of the native plants that would normally keep invasive weeds in check through competition have been replaced by other non-native annuals such as cheatgrass. Adaptations of invasive plants include high rates of reproduction via rootstocks, stolons, an excessive production of seed, and accelerated dispersal by water, air and animals.

Based on data collected during the 2007 summer monitoring, and subsequent evaluations, the Team Members and Advisors have recommended the following activities. The summary of activities and cost table below identifies rehabilitation costs charged or proposed for funding from subactivity 9262 funding sources.

TABLE 16. REHABILITATION ACTIVITIES COST SUMMARY TABLE – SOUTH END COMPLEX & BASQUE WELLS & CRATERS FIRES

Spec #	Title	Unit	Unit Cost	# of Units	Work Agent	Cost
1	Fund a Implementation Leader, and Admin support to continue implementation & oversight of the Fire Rehab Plan for FY 2008	Pay Periods	$3,230.38	8	FA	$ 25,843
2	Invasive noxious weed control, Grandad/Craters/Basque Wells	Acre	$ 87.10	3,391	C	$ 295,360
3	Riparian Restoration, Mud & Bridge Creeks	Restoration Sites	$2,643.97	33	C	$ 87,251
4	Seeding Heavily Burned Noxious Weed Control Areas in the Grandad/Craters burn areas	Acre	$ 246.25	250	C-FA	$ 61,563
TOTAL COST						**$ 470,017**

PART I - INDIVIDUAL SPECIFICATION # 1

TREATMENT/ACTIVITY NAME	Implementation Leader	PART E SPECIFICATION #	#1
NFPORS TREATMENT CATEGORY*	Administration	FISCAL YEAR(S) (list each year):	2008
NFPORS TREATMENT TYPE *	Implementation	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	N/A

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Fund a project leader and associated personnel to continue coordination and oversight of the implementation of the South End Complex ES Plan for the US Fish and Wildlife Service lands. This specification provides funding for the fiscal year 2008.

B. Location/(Suitable) Sites: Treatment areas are distributed throughout four (Basque Wells, Craters, Krumbo Butte and Grandad) of the seven fires on the South End Complex on lands within US Fish and Wildlife Service jurisdiction, and will need to be administered on a per fire basis.

C. Design/Construction Specifications:

1. The Implementation Leader is responsible for the oversight of the implementation of the South End Complex ES Plan on the Malheur National Wildlife Refuge lands.
2. The Leader will write contracts, implement each treatment to achieve efficient use of funds, personnel, equipment, and contracts.
3. The Leader will oversee monitoring, program review, proposed plan revisions, and supplemental funding requests.
4. The Leader will complete annual and final accomplishment reports. The Leader manages ES budgets and tracks expenditures by specification and coordinates projects to insure events take place in their proper order.

D. Purpose of Treatment Specifications: The purpose is to provide quality control and accountability over project implementation.

E. Treatment consistent with Agency Land Management Plan: (Malheur National Wildlife Refuge Master Plan/Environmental Assessment, USFWS, 1985. Blitzen Valley Management Plan, Malheur National Wildlife Refuge, USFWS, 1990).

F. Treatment Effectiveness Monitoring Proposed: The Leader will prepare detailed accomplishment reports to insure project monitoring and budget accountability with the aid of an administrative person.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
GS-11 Implementation Leader @ $2849/pay period (includes benefits) @ 7 pay periods X 1 fiscal Year	$ 19,943
GS-7 Admin Assistant @ 1,900/pay period (includes benefits)/pay period X 1 pay periods X1 fiscal year	$ 1,900
TOTAL PERSONNEL SERVICE COST	$ 21,843
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or rent.	**COST / ITEM**
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Office material and supplies @ $ 2000 X 1 year	$ 2,000
TOTAL MATERIALS AND SUPPLY COST	$ 2,000

TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
Implementation Leader Travel Costs @ $2000/year X 1 year	$ 2,000
TOTAL TRAVEL COST	$ 2,000
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY_08	10/01/2007	09/30/2008	F	Pay Period	$ 3,230	8	$ 25,843
						TOTAL	$ 25,843

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	P,M
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	P,M
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Relevant Documentation and Cross-Reference Location within this plan.

TOTAL COST BY JURSIDICTION

JURISDICTION	UNITS TREATED	COST
US Fish and Wildlife Service, Malheur National Wildlife Refuge	8 Pay Periods	$ 25,843
	TOTAL COST	$ 25,843

PART I - INDIVIDUAL SPECIFICATION # 2

TREATMENT/ACTIVITY NAME	Invasive Weed Control	PART E SPECIFICATION #	# 4 Weed Control-Herbicide
NFPORS TREATMENT CATEGORY*	Invasive Species	FISCAL YEAR(S) (list each year):	2008
NFPORS TREATMENT TYPE *	Chemical Treatment	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	N/A

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description: Control known non-native weed infestations within the South End Complex, Basque Wells and Crater fires perimeters prior to seed-set and maturation. Utilize integrated pest management techniques (herbicides, mechanical and cultural control methods) as appropriate to prevent the spread and establishment of noxious weeds within the fire areas.

B. Location/(Suitable) Sites: Control all known exotic weed populations particularly along road systems, riparian areas, recreation sites, and suppression related sites within the fire area. The estimated acreage of known noxious weeds within the fire area is determined to be 3,391 acres. Refer to the proposed noxious weed control area map for exact locations of noxious weeds and weed treatment areas.

C. Design/Construction Specifications:

1. Control noxious/non-native weeds identified during MNWR monitoring surveys prior to seed set. All acres will be treated Contractor. Use truck-mounted sprayers, ATV-mounted sprayers, or backpack sprayers (depending on access and ability for Contractors to reach infestations), to apply herbicides to selected noxious weed populations. All spraying will be in accordance with guidelines contained within MNWR management plans and approved Environmental Assessments using herbicides approved for use on FWS lands in Oregon at the time treatments take place. Examples of approved herbicides include Telar®, and Tordon®.
2. Hand grub noxious weeds located at springs and along perennial creeks where chemical treatments can not be done. Work will be conducted by Contractor.
3. Follow-up control in following 2 years on all new infestation sites as identified through noxious weed detection monitoring surveys will be through rehabilitation funding requests.

D. Purpose of Treatment Specifications: Control of listed noxious weeds needs to be conducted or they will spread into non-infested areas of the burn. Noxious weeds cause plant community destabilization, unnatural increased fire cycles, reduction in species diversity, and overall watershed degradation.

E. Treatment Effectiveness Monitoring Proposed: Conduct monitoring for detection of noxious weeds and control effectiveness. Control of noxious weeds in burned areas will be monitored according to our district protocols. Control will be considered to be successful upon determination that all noxious weeds have been eliminated or populations reduced substantially.

Implementation Leader:

A. General Description: Conduct noxious weed detection surveys for possible invasion of noxious weeds on roads, hand lines, dozer lines, and other disturbed areas within the South End Complex (Craters/Grandad/Basque Wells) Fire. Monitor existing noxious weed infestations within the burned area to determine if expansion is occurring into non-infested areas. Inventory for noxious weeds near existing locations and in areas that have a high probability for invasion within the burned area.

B. Location/(Suitable) Sites: Survey at known locations of noxious weeds. Inventory areas that have a high potential for weed invasion (as determined by MNWR staff). Critical areas include drainages, roads, and along dozer lines of burned areas where vehicles may have run through noxious weed populations.

C. Design/Construction Specifications:

1. Conduct detection surveys out from known noxious weed populations within the burned area using protocol determined by the MNWR staff. Survey areas disturbed by the fire and areas close to known noxious weed populations with high likelihood of weed establishment to determine spread of noxious weed populations. Detection protocols will be

established by MNWR and will be implemented in accordance with current management plans.

2. Inventory, photo document, and map new weed infestations within disturbed lands using Global Positioning System (GPS).

D. Purpose of Treatment Specifications: Noxious weeds are known to expand and establish in disturbed areas. Some weeds are particularly prone to establishment following fire. It is critical to detect these new weed populations as quickly as possible to increase the likelihood of successful management of these infestations.

E. Treatment consistent with Agency Land Management Plan (identify which plan): Malheur National Wildlife Refuge Fire Management Plan, Blitzen Valley Management Plan.

F. Treatment Effectiveness Monitoring Proposed: Surveys will be considered successful upon determination that all potential locations of new noxious weed populations have been visited and documented. If weeds are found, they will be treated at the earliest opportunity

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
GS-11 Implementation Leader @ $ 2849/pay period (includes Benefits) @ 13 pay periods X 1 fiscal year	$ 37,037
GS- 7 Range technician @ $1,836/ pay period (includes benefits) @ 6 pay periods X 1 fiscal Year	$ 11,016
GS-5 Bio Technician @ $ 1,195/pay period @ 6 pay period X 1 fiscal year	$ 7,170
TOTAL PERSONNEL SERVICE COST	$ 55,223
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**
Monitoring Supplies @ $ 800/each X 1 year	$ 800
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	$ 800
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Herbicide: Telar® @ $15/acre X 1458acres X 1 year	$ 21,870
Herbicide: Milestone@ $22/acre X 1933 acres X 1 year	$ 42,526
Surfactant: Syl-Tac® @ $6/acre X 3391 acres X 1 year	$ 20,346
TOTAL MATERIALS AND SUPPLY COST	$ 84,742
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
GS-11/7/5 Travel Costs @ $ 2,000/year x 1 year	$ 2,000
TOTAL TRAVEL COST	$ 2,000
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Contractor – Weed Control @ $45/acre x 3,391acres x 1 year	$ 152,595
TOTAL CONTRACT COST	$ 152,595

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY_08_	10/01/2007	09/30/2008	S,F	Acres	$ 87.10	3,391	$ 295,360
						TOTAL	$ 295,360

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	C,M
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Vegetation Resources Assessment, Appendix I, and Vegetation Treatments/Monitoring Map, Appendix III BEAR Plan.

TOTAL COST BY JURSIDICTION

BASQUE WELLS	CRATERS	KRUMBO BUTTE	GRANDAD	UNITS TREATED	COST
$ 14,768	$ 191,984		$ 88,608	3,391	$ 295,360
				TOTAL COST	$ 295,360

PART I - INDIVIDUAL SPECIFICATION # 3

TREATMENT/ACTIVITY NAME	Riparian Site Rehabilitation – FWS Mud & Bridge Creeks	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*	Wildlife Habitat	FISCAL YEAR(S) (list each year):	2008
NFPORS TREATMENT TYPE *	Stream Habitat Improvement	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	N/A	IMPACTED T&E SPECIES	Federal Candidate Species: Columbia Spotted Frog / State Sensitive Species: Redband trout

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

Number and Describe Each Task:

A. General Description:

1. Utilize Contract crew/machinery for planting nursery riparian & wetland plants in Mud and Bridge Creek Burn areas on US Fish and Wildlife Service land.
2. Use FWS personnel for seeding areas adjacent to banks on Mud and Bridge creeks on US FWS land.

B. Location/(Suitable) Sites:

1. Sites within Mud and Bridge Creeks burn boundaries identified via GPS (map).

C. Design/Construction Specifications, Contracting: Implementation Leader/Staff

1. Plantings of native riparian trees/shrubs/grasses to re-establish vegetation in severely burned portions of Mud and Bridge Creek: Redosier dogwood, Quaking aspen, elderberry, Golden current, Willow Spp., Nebraska sedge, Baltic rush, American sloughgrass, variety Egan, and Three-square bulrush. Seeding of upland grass mixture of Hard fescue, Streambank wheatgrass, variety Sodar, Canby bluegrass, variety Canbar, and Sheep fescue, variety Covar/Durar.
2. Placement of willow bundles/mats and (on site) juniper branches and stems on priority identified stream banks to provide bank protection and cover to existing and new riparian vegetation from over utilization from beaver and deer. Requires heavy equipment (Excavator/Flatbed Truck) to harvest willows and move to Mud/Bridge Creek sites.

D. Purpose of Treatment Specifications (relate to damage/change caused by fire): Improve riparian component for wildlife and provide firebreaks for future wildfire events.

E. Treatment consistent with Agency Land Management Plan: South End Complex and Basque Wells and Craters Fires, Burned Area Emergency Stabilization Plan, Malheur National Wildlife Refuge

F. Treatment Effectiveness Monitoring Proposed: Establish monitoring riparian transects within Mud and Bridge Creeks drainages to determine effectiveness of proposed vegetative treatments to meet objectives of BAER rehabilitation plan.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
Implementation Leader:GS-11 @ $ 2,849/pay period X 4 pay periods (includes benefits) X 1 year	$ 11,396
Range Technician: GS-07 @ $1,836/pay period X 6.5 pay periods (includes benefits) X 1 year	$ 11,934
Bio Technician: GS-05 @ $ 1,195/pay period X 4.5 pay periods X 1 year	$ 5,378
Cultural Clearance GS-11 @ $ 2,849/pay period X 1 pay period (includes benefits) X 1 year	$ 2,849
TOTAL PERSONNEL SERVICE COST	$ 31,557
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	**COST / ITEM**

TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	**COST / ITEM**
Monitoring Supplies @ $800/yr x 2 years	$ 1,600
850 2– 4-year old plants + covers + planting @ $ 5.34/unit X 1 year	$ 4,539
Seed Material: 20 acres @ 25 Lb/acre = 500 Lb @ $ 5.00/Lb X 1 year	$ 2,500
TOTAL MATERIALS AND SUPPLY COST	$ 8,639
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	**COST / ITEM**
Interior vehicle for GS-11: $0.52/mile X 100 miles/day X 30 days X 1 year	$ 1,560
Interior vehicle for seasonal GS-07/05: $0.52/mile X 100 miles/day X 60 days X 1 year	$ 3,120
TOTAL TRAVEL COST	$ 4,680
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	**COST / ITEM**
Moving equipment to and from harvest site: $ 150.00/hr @ 10 hrs x 1 year	$ 1,500
Travel/Lodging expenses Crew of 10, @ $ 425.00/day X 15 days x 1 year	$ 6,375
Labor @ 8 crew@ $25/hr x 8 hr/day x 15 days x 1 year	$ 24,000
Planting Crew: 850 nursery plants @ $2.00/plant x 1 year	$ 1,700
Flatbed/Dump Truck: @ $45.00/hour x 8 hr/day x 10 days x 1 year	$ 3,600
Willow Cutting @ $160/hr x 32 hours x 1 year	$ 5,120
TOTAL CONTRACT COST	$ 42,295

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNITS	UNIT COST	PLANNED ACCOMPLISHMENTS	PLANNED COST
FY_08_	10/15/2007	09/30/2008	S, F	Sites	$ 2,642	33	$ 87,171
						TOTAL	$ 87,171

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	C, M
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Wildlife Resources Assessment, Appendix I, and Bodies of Water Inhabited by Columbia Spotted Frog Map, Appendix III BEAR Plan.

TOTAL COST BY JURSIDICTION

JURISDICTION GRANDAD	UNITS TREATED	COST
$ 87,171	33	$ 87,171
	TOTAL COST	$ 87,171

PART I - INDIVIDUAL SPECIFICATION # 4

TREATMENT/ACTIVITY NAME	Seeding Heavily Burned Noxious Weed Control Areas	PART E SPECIFICATION #	
NFPORS TREATMENT CATEGORY*	Invasive Species	FISCAL YEAR(S) (list each year):	FY 2008
NFPORS TREATMENT TYPE *	Prevention/Seeding	WUI? Y / N	N
IMPACTED COMMUNITIES AT RISK	NA	IMPACTED T&E SPECIES	NA

* See NFPORS Restoration & Rehabilitation module - Edit Treatment screen for applicable entries.

WORK TO BE DONE (describe or attach exact specifications of work to be done):

A. General Description:

Seed heavily burned weed control areas to a grass mixture in order to maintain ecological stability, minimize invasion of cheatgrass and noxious weeds (Canada thistle, Whitetop, Russian knapweed, Perennial pepperweed, Bull thistle), and stabilize areas identified as having high wind erosion hazard in order to minimize topsoil loss and fugitive dust. Seed mixes utilize species that are adapted to the sites and are selected for their competitive nature and tolerant of herbicide treatments.

To maximize probability of success, seed will be applied concurrent with fall/winter moisture period between October and December 2007. Expected first year effectiveness includes stabilization of the soil surface, reducing topsoil loss, improving soil infiltration of moisture, providing competition for invasive non-native species and replacing any organic litter which was consumed by fire. First season vegetation establishment will be by perennial native and non-native grasses, shrubs and forbs. It is expected that vegetation establishment will be successful on all sites although the presence or absence of timely moisture could be a limiting factor.

B. Location/(Suitable) Sites:

1.) Sites within Grandad and Craters burn boundaries with moderate to high vegetation mortality that are susceptible to invasion by non-native invasive species and 2.) Areas identified as having high wind erosion and moderate to high burn severity. Proposed areas were prioritized and field verified based on post-fire condition, presence of invasive spp. , and suitability for drill seeding (suitable slopes and surface rock content). Suitable sites are identified in Appendix III, under Seeding Area Map # 3.

C. Design/Construction Specifications:

Seed areas have been pre-identified for treatment and mapped by Field Office personnel. Seed should be applied in the fall/winter moisture season between October and December in order to maximize probability of success.

Large applications will be conducted by rangeland drill, small applications via an ATV mounted spreader on areas with favorable access, soil conditions, and slope. The area should have limited rock and gentle terrain. The tractor and drill operators will apply seed at specified rates. If seed is stored prior to application, it must be protected from moisture, stored under dry conditions and be protected from rodents.

Equipment is calibrated to project specifications established and administered by the local office.

Seed Mixture: The following seed is specified for use on this project on upland sites: Great Basin wildrye, variety Magnar, (6lbs/Ac), Western wheatgrass, variety Rosana, (5lb/Ac), Tall wheatgrass, variety Alkar (6lbs/Ac) and Tall fescue, variety Alta (8 lb/acre). Appropriate clearances (NEPA and Archeological) are to be obtained prior to implementation. Monitoring will be conducted on seed application rates, treatment sites, and contact compliance during seed operations.

D. Purpose of Treatment Specifications: The purpose of this treatment is to establish vegetation on areas that have been burned to stabilize the sites, minimize wind erosion, and seeding to prevent establishment of invasive plants. Live native seed banks were determined to be impacted by the fire to the extent that satisfactory establishment of native vegetation is not likely to occur within the next two growing seasons.

E. Treatment Effectiveness Monitoring Proposed: Monitoring for re-vegetation success will accompany seeding activity. See Specification 3, Monitoring Effectiveness. Establishment of both seeded and natural re-vegetation will be monitored according to the strategy outlined in the specification. Re-vegetation will be considered to be successful

upon establishment of 3 to 5 plants per square meter on suitable sites identified in the monitoring specifications. Monitoring is required to determine seeding success and effectiveness of proposed vegetative treatments to meet noxious weed objectives of the fire rehabilitation plan.

LABOR, MATERIALS AND OTHER COST:

PERSONNEL SERVICES: (Grade @ Cost/Hours X # Hours X # Fiscal Years = Cost/Item): Do not include contract personnel costs here (see contractor services below).	COST / ITEM
Implementation .Leader, GS-11 @ 2,849/pay period (includes benefits) X 3 pay periods X1 year	$ 8,547
Range Technician, GS-07 @ $ 1836/pay period (includes benefits) X 3.25 pay periods X 1 year	$ 5,967
Bio Technician, GS-5 @ $ 1195/pay period X 3.25 pay periods X 1 year	$ 3,884
Equipment operator, GS-07 @ $22/hr X 8 hrs/day X 20 days X 1 year	$ 3,520
Cultural Clearance GS-11 @ $ 2849/pay period (includes benefits) X 1 pay period X 1 year	$ 2,849
TOTAL PERSONNEL SERVICE COST	$ 24,767
EQUIPMENT PURCHASE, LEASE AND/OR RENT (Item @ Cost/Hour X # of Hours X #Fiscal Years = Cost/Item): Note: Purchases require written justification that demonstrates cost benefits over leasing or renting.	COST / ITEM
TOTAL EQUIPMENT PURCHASE, LEASE OR RENTAL COST	
MATERIALS AND SUPPLIES (Item @ Cost/Each X Quantity X #Fiscal Years = Cost/Item):	COST / ITEM
Miscellaneous field supplies including ATV equipment @ $500/year X 1 year	$ 500
Seed for 250 acres @ 21 lb/acre = 5,250 lbs@ $5.68/lb X 1 year	$ 29,820
TOTAL MATERIALS AND SUPPLY COST	$ 30,320
TRAVEL COST (Personnel or Equipment @ Rate X Round Trips X #Fiscal Years = Cost/Item):	COST / ITEM
Vehicle for GS-11/07/05; $ .52/mile X 80 miles/day X 60 days X 1 year	$ 2,496
Refuge tractor/Drill $25/hour X 8 hr/day X 20 days X 1 year	$ 4,000
TOTAL TRAVEL COST	$ 6,496
CONTRACT COST (Labor or Equipment @ Cost/Hour X #Hours X #Fiscal Years = Cost/Item):	COST / ITEM
TOTAL CONTRACT COST	

SPECIFICATION COST SUMMARY

FISCAL YEAR	PLANNED INITIATION DATE (M/D/YYYY)	PLANNED COMPLETION DATE (M/D/YYYY)	WORK AGENT	UNIT S	UNIT COST	PLANNED ACCOMPLI SHMENTS	PLANNED COST
FY_08_	10/15 2007	12/31/2007	F	Acres	$ 246.33	250	$ 61,583
						TOTAL	$ 61,583

Work Agent: C=Coop Agreement, F=Force Account, G=Grantee, P=Permittees, S=Service Contract, T=Timber Sales Purchaser, V=Volunteer

SOURCE OF COST ESTIMATE

1.	Estimate obtained from 2-3 independent contractual sources.	
2.	Documented cost figures from similar project work obtained from local agency sources.	M
3.	Estimate supported by cost guides from independent sources or other federal agencies	
4.	Estimates based upon government wage rates and material cost.	E P
5.	No cost estimate required - cost charged to Fire Suppression Account	

P = Personnel Services, E = Equipment M = Materials/Supplies, T = Travel, C = Contract, F = Suppression

RELEVANT DETAILS, MAPS AND DOCUMENTATION INCLUDED IN THIS REPORT:

See Burned Area Emergency Stabilization Plan, South End Complex, Basque Wells & Craters Fires, Vegetation and Range Resources Assessment, ESP: Invasive Species. Also Map # 3, Seeding Locations, this plan.

TOTAL COST BY JURSIDICTION

JURISDICTION	GRANDAD	CRATERS	BASQUE WELLS	UNITS TREATED	COST
	$ 12,322	$ 49,261		250	$ 61,583
				TOTAL COST	$ 61,583

PART J – CONSULTATIONS

CONSULTATIONS

Resource Advisors , USFWS 541-493-2612

Donna Stovall, Refuge Manager
Chad Karges, Deputy Refuge Manager
Rick Roy, Fish & Wildlife Biologist
Shane Theall, Fire Management Officer
Carla Burnside, Cultural Resources
Carey Goss, Park Ranger
Jess Wenick, Range Management Specialist
Tom Downs, Maintenance Work Leader
Bill Modey, P-Ranch Substation Manager
Andy Renc, Buena Vista Substation Manager
Dan Morris, Maintenance Mechanic

Consultants

Gary Page, Malheur County Weed Specialist 541-473-5102
Chris Hoag, Hydrologist/Wetland Plant Ecologist, NRCS..... 208-397-4133

Bureau of Land Management

Bill Anderson, Range Staff Specialist.....541-573-4400
Pam Keller, Soil Scientist/GIS Specialist.....541-573-4400
Kelly Hazen, GIS Specialist.....541-573-4400

PART K – CHRIS HOAG, NRCS WETLAND PLANT ECOLOGIST REPORT ON INVESTIGATION INTO CONDITION AND RECOVERY OF MUD CREEK

United States Natural Aberdeen PMC
Department of Resources P.O. Box 296
Agriculture Conservation Aberdeen, ID
Service 83210

The Natural Resources Conservation Service, AN EQUAL OPPORTUNITY EMPLOYER
formerly the Soil Conservation Service, The Plant Materials Programis
an agency of the PLANT SOLUTIONS FOR CONSERVATION NEEDS
United States Department of Agriculture.
Riparian/Wetland Project website – http://Plant -Materials.nrcs.usda.gov/idpmc
Date: June 12, 2007
To: Donna Stovall, Refuge Manager
Malheur Refuge HQ
36391 Sodhouse Lane
Princeton, OR 97721-9523

Subject: Report on investigation into condition and recovery of Mud Creek after 2006 fire
On June 11, 2007, I was asked by the refuge to investigate the condition of Mud Creek after it was burned in August, 2006. Mud Creek is located southeast corner of the refuge and is considered critical riparian habitat on the refuge. The objective of my investigation is to determine current and potential condition of the riparian zone and to make recommendations on alternatives for the restoration of the riparian zone.
On June 12, 2007, we assessed Mud Creek from the park boundary to the beginning of the delta above East Canal Road. This portion of Mud Creek was burned by a hot, fast moving fire that burned or scorched most of the vegetation in the riparian zone. There were large areas of ash that had little but weeds growing in them. As fire typically sets back succession, weeds like

Canadian thistle, perennial pepperweed, Jim Hill Mustard, and other annuals have multiplied and spread. Damage to the perennial plant community was unclear until we looked at the site. The grasses and wetland plants have come back surprisingly well. Almost all of the riparian woody plants had been burnt or scorched. However, 80-90% of the willows and dogwoods have resprouted.

To assess the Mud Creek riparian area, we used the Stream Visual Assessment Protocol (SVAP) that was developed by the Natural Resources Conservation Service (NRCS 1998). This protocol assesses up to 15 different factors on the stream and gives a repeatable evaluation of its condition. We looked at 12 different factors and rated them. The score was totaled and divided by the total number of factors to give a total score average of 9 which is rated as excellent. Fire damage (scorched areas, new growth, dead willow and dogwood tops in the stream, etc) will drop this score to Good.

My observations during the assessment of Mud creek were:

• Areas that were burned so hot that all of the vegetation was destroyed and nothing is coming back in except a few noxious weeds. These areas are extremely susceptible to wind and water erosion. I would suggest a late dormant seeding of a grass mix after weed control during the summer.

3

• Significant sediment from the fire has moved down the system and deposited in the meanders. In some areas it is 2.5 ft deep and averages about 8-12 in. Wetland plants like creeping spikerush (Eleocharis palustris) and sedges (Carex sp.) are moving into some of this sediment but the rest of it is still mobile. A large flow will move this sediment down the system and could cause significant problems. Maintaining vegetative roughness and monitoring after large events are about all that can be done for this problem.

• Dead branches of the willows and dogwoods that were not burnt up in the fire have fallen into the water. Most of them are still somewhat attached to the bases and are providing excellent shade, cover and roughness to the system. However, a large flow could rip them loose and cause them to pile up in certain areas of the system which will cause debris dams that can push the flow into areas that may not be protected by vegetation or rock. At the present time, they are providing valuable benefits to the stream and they should be left as is. Monitoring after a large event will be important.

4

• The fire has removed much of the shrub, mid-level tree, and tall tree strata from riparian zone. It has also decreased the diversity. This will take time to establish and regrow.

Planting larger potted shrubs and trees will accelerate the recovery of the area. Planting potted plants larger than ½ in caliper stems and taller than 4 ft will reduce damage from rodents (mainly beaver, muskrats, voles, rabbits, etc) and deer. Most of these should be caged with 2x4 in welded wire (4-5 ft high) and at least 3 ft in diameter and staked down with T posts.

• The additional trees and shrubs can be planted in places adjacent to the stream channel. Water will be the key to their success. There are a number overflow channels and old oxbow bends that are wet now and/or appear to have a subsurface water table. Additional investigation with a soil auger or shovel should be able to establish the depth to water. The installation of piesometers will also help to map the water levels over the course of the summer which will provide important planting information. Plant the potted plants on the side of these overflow channels above the sedge community that is in the bottom of the channel. Do not plant them in the sedges as the area will typically be too wet and there will be too much competition from the sedges for the woody species to establish well. This will add additional strata to the riparian area outside the riparian zone.

5

• We identified a number of eroding meander cut banks that if not protected will continue to erode and put additional sediment in the stream. Most of these cutbanks for lost their woody component by fire, past farming practices, or grazing use. Willows and dogwood should be planted on these cutbanks and the toe protected by juniper revetment. I would recommend sloping the banks to a 3:1 slope, planting vertical bundles on 4-6 ft spacing, planting the containerized plants between the willow vertical bundles, and protecting the toe of the slope with juniper revetment.

BANK EROSION, MUD CREEK

• During the assessment, we GPSed these cutbanks and documented their length and height. We also prioritized these cutbanks in terms of critical, high, medium and low priority. Critical priority cutbanks should be treated as soon as possible. High priority cutbanks should be treated within 2 years and the medium and low priority sites can be treated as time, money, and labor are available.

MUD CREEK STREAMBANK BURNED TO THE WATERLINE

6

• We also saw several reaches where the fire had burned clear down to the waterline. This removed all the vegetation that would protect the bank during runoff. I would recommend that a coir erosion control fabric be installed on these sites to reduce the erosion until the vegetation is established well enough to protect the bank. There are a number of distributors who could provide the appropriate material. I would suggest a short lived coir weave (not straw and not polypropylene) that will last about 1-2 years. It should have ½ to ¾ in squares in the weave. Plant a grass seed mix on the bank before installing the erosion control fabric. Install the fabric according to the manufacturers' recommendations.

For the bank treatments, refer to the Practical Streambank Bioengineering Guide for installation and construction guidelines. I recommend the following Soil Bioengineering Treatments:

• Vertical bundles made from willow and dogwood cuttings. Use 3-5 stems per bundle. Tie with cotton string every 2 ft on the lower ¾ of the bundle. Leave the top ¼ of the bundle untied. Plant on a 4-6 ft spacing.

• Slope the vertical slopes to a 3:1 slope where possible.

• Plant potted species in between the vertical bundles in the top 1/3 of the bank.

They should be planted on top of the clay layer that was identified in the soil profile.
• Use small juniper trees (6-8 ft high live junipers will work the best) as shrub revetments installed at the toe of the slope. They should extend no farther than 4 ft into the channel on one side. Install so the main stem is against the toe of the bank and the branches are facing downstream. Build the revetment line just like shingling a roof. Start at the downstream end of the bank. Start at a stable point like a rock, tree, etc. even though it may be farther down the bank so that the water will not eat around the end of the revetment line. Hold the revetment in place with Duckbill earth anchors or rock bolsters.
• Another option for the toe protection on banks that are not very high (2-3 ft instead of 4-6 ft) is a fascine. A fascine is a bundle of willows that are tied together with a diameter of 8-12 in. This bundle of willows is installed horizontally at the toe of the slope with stout wooden stakes (3 ft long 2x4s cut diagonally to make a wedge shaped stake) pounded into the bed every 2 ft. Further detail on how to build a fascine can be found in the Practical Streambank Bioengineering Guide.

7
• Pole plantings can be installed with the waterjet or a bar along the whole cutbank. Plant unrooted cuttings in between the other treatments. Spacing should be close together. Think porcupine! With the waterjet, installing these cuttings is very fast and efficient. It is important to put a "row" below the CFW - Channel forming width (Bankfull Width). It will break up the side vortices that are very erosive on the bank. This "row" should be considered a sacrifice row since not many will grow. The others above the CFW will grow like crazy.
• Consider planting a grass seed mix on the exposed bank around the vertical bundles and potted plants. Plant after the spring runoff and before it gets too hot. Another option is to use sod mats that are harvested from the streambank or adjacent areas. Sodmats should be 6-8 in thick and small enough to be moved by hand labor. Install just like sod in a lawn.
• With all the plantings, use lots of water as they are installed. 5 gal buckets will be very helpful. Water everything extensively and deeply right after planting. Additional watering will be helpful but not absolutely necessary.
• A number of Malheur NWR employees attended a riparian workshop that I put on in October 2002 and should be familiar with the treatments that I have listed. Details can be found in the technical handouts in the back of the Practical Streambank Bioengineering Guide.
Another question that was brought up is how to calculate the cost of the fire on the riparian area of Mud Creek. In order to make this calculation, you will need the length of the streambanks that were significantly burned by the fire. This length can be in linear feet. Those areas of streambank that have lost its entire woody component are much more susceptible to erosion damage than those that have significant regrowth. In riparian zones, the area of the riparian zone is considered to be two times the channel forming width (also called bankfull width) on each side. I estimated the channel width at 12 ft. So, two channel widths would be 24 ft. To determine the cost of the fire on the riparian zone, take the linear feet of streambank that is burnt and multiply it by 24 to get square feet. Convert this area measurement to acres by dividing the area in square feet by 43,560. This will give you a rough estimate of the number of riparian acres significantly damaged by the fire. If both sides are burnt, then you can multiply the acres

by 2.
I would estimate the cost of installing the soil bioengineering treatments at $50-60 per linear foot of bank treated because of the remoteness of the site and the need to harvest and install materials collected from a long way away. This cost includes only the bank treatments and does not include plantings in the two channel widths of the riparian zone. Plantings that are made in the two channel widths away from the stream channel will be an additional cost (plants, transportation, watering, and installation).

References:
These can be downloaded from my website: **http://www.plantmaterials.nrcs.usda.gov/idpmc/riparian.html**

8
Bentrup, G. and J.C. Hoag. 1998. The *Practical Streambank Bioengineering Guide*. USDANRCS Aberdeen Plant Materials Center, Aberdeen, ID. May 1998. 151p.
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Hoag, J.C. 1993. *Technical Note 23: How to plant willows and cottonwoods for riparian rehabilitation*. USDA-NRCS, Boise, ID. ID-TN23, Sept. 1993. 15p.
Hoag, J.C. 2003. *Technical Note 42: Willow Clump Plantings*. USDA-NRCS Aberdeen Plant Materials Center, Boise, ID. ID-TN42, Dec. 2003. 8p.
Hoag, J.C. and J. Fripp. 2005. *Riparian/Wetland Project Information Series No. 18: Streambank Soil Bioengineering Considerations for Semi-Arid Climates*. USDA-NRCS Aberdeen Plant Materials Center, Aberdeen, ID. Information Series 18, June 2005. 15p.
Hoag, J.C., F.E. Berg, S. K. Wyman, and R.W. Sampson. 2001. *Riparian/Wetland Project Information Series No. 16: Riparian Planting Zones in the Intermountain West*. USDANRCS Aberdeen Plant Materials Center, Aberdeen, ID. Mar. 2001. 24p.
Natural Resources Conservation Service. 1998. *Stream Visual Assessment Protocol*. NWCC-TN-99-1. National Water and Climate Center, Portland, OR (download from http://www.wcc.nrcs.usda.gov/wqam/wqam-docs.html)
Ogle, D.G., J.C. Hoag, and J. Scianna. 2000. *Technical Note 32: Users guide to description, propagation and establishment of native shrubs and trees for Riparian Areas in the Intermountain West*. USDA-NRCS, Boise, ID and Bozeman, MT. ID-TN32, Feb. 2000. 22p.
I appreciated the opportunity to work with Malheur NWR again. Thanks to Ed Gheen and Rick Roy for inviting me and helping me with assessment of Mud Creek.
If you have additional questions, please don't hesitate to contact me.
Chris Hoag
Wetland Plant Ecologist
Email: chris.hoag@id.usda.gov
Electronic Cc: Mark Weatherstone, ASTCTS, NRCS, Boise, ID
Chad Karges, Deputy Manager, Malheur NWR, OR
Rick Roy, Biologist, Malheur NWR, OR
Ed Gheen, Malheur NWR, Princeton, OR

PART L. COST/RISK ANALYSIS SUMMARY

The following is a comparison analysis of proposed rehabilitation activities verses a no action alternative and the associated cost/risk for the 2008 season:

1. TREATMENT ANALYSIS

Treatments Malheur Refuge	Cost
Fund a Project Leader to Continue Implementation & Oversight of Fire Rehabilitation	$ 25,843
Invasive Noxious Weed Control, Malheur Refuge	$ 295,360
Riparian Restoration, Mud & Bridge Creeks	$ 87,171
Seeding of Heavily Burned Noxious Weed Control Areas (250 Acres)	$ 61,583
Total Cost	$ 469,957

2. PROBABILITY OF REHABILITATION TREATMENTS SUCCESSFULLY MEETING FIRE RESTORATION OBJECTIVES

Treatments	Units	%
An Implementation Leader and associated personnel is required to carry out the oversight and monitoring of rehabilitation activities.	3,641 Acres	98%
Invasive Noxious Weed Control	3,391 Acres	85%
Riparian Restoration, Mud & Bridge Creeks	33 Sites	98%
Seeding Heavily Burned Noxious Weed Control Areas	250 Acres	100%
Noxious Weed Detection/Monitoring	3,391 Acres	100%

3. RISK OF RESOURCE VALUE LOSS OR DAMAGE

Identify the risk (high, medium, low, none or not applicable (NA)) of unacceptable impacts or loss of resources.

No Action- Treatments Not Implemented (check one) **Probability of Risk**

Resource Value	None	Low	Mid	High
Implementation Leader; Present refuge responsibilities and duties exceed the permanent refuge personnel available. No Action will result in continued deterioration of refuge habitat with little opportunity for change.				XX
Noxious Weed Control; Without this activity being closely managed, the reduction of native vegetation will continue, and the repetition of fire occurrence will escalate.				XX
Mud/Bridge Creek Restoration; No Action will result in increased occurrence of noxious weeds, increases bank sloughing/sediment transport, and increased damage to the Columbian Spotted Frog, Red-band Trout, and overall riparian habitat.				XX
Seeding Heavy Burned Noxious Weed Areas; Without seeding, the presence of noxious weeds in these areas will increase because of the lack of competition of native species.				XX
Noxious Weed Monitoring; No action will result in a loss of valuable native sites and simply continue the downgrading of available nesting/brood rearing and essential habitat for waterfowl, upland game birds, and wildlife in general.				XX
Protective Fence; Fencing is required to provide alternatives for management. Without protection, fields are not manageable, and habitat deteriorates because of increased spread of weeds by ungulates.				XX

Proposed Action - Treatments Successfully Implemented Probability of success

Resource Value	None	Low	Mid	High
The presence of an Implementation Leader will coordinate all proposed restoration activities, carry through with field inspections of contracts, and provide monitoring of success.				XX
Control activities of Noxious Weeds will provide opportunities for establishment of native grasses/forbs/shrubs for improved wildlife habitat.				XX
Mud/Bridge Creek restoration will start vegetative recovery and bank stabilization. Sediment flows will decrease, and overall stream condition will improve.				XX
Seeding of burned areas will provide ground cover and a seed source of desirable native species.				XX
Monitoring Noxious Weeds will track infestations for control, and evaluate degree of success of control efforts.				XX
Reconstruction of interior protective fence will provide for needed management of sensitive areas and reduce transport of invasive weed seed.				XX

4. SUMMARY

The costs of the project and probability of success of the proposed treatments are compared with the risks to resource values if: 1) no action is taken, and 2) the proposed action is successfully implemented. Alternatives may be included in this analysis to assist in the selection of the treatments that will cost effectively achieve the BAER objectives. Answer to the following questions determine which proposed BAER treatments should be selected and implemented.

1. Are the risks to natural resources acceptable as a result of the fire if the following actions are taken?

Proposed Action Yes |_X_| No |__| Rationale for answer: A comparative evaluation between a no action and proposed action alternative must objectively show beyond a reasonable doubt the value of implementing the proposed action.

In this case the proposed action is required to reverse the declining habitat quality on the Malheur Refuge. Due to the invasion of cheat grass and other annuals, there exists a continuous carpet of fire available annual grasses and forbs, flammability is now higher and fire frequency, in recent years, has increased. Realistic management goals should address eradication of invasive annuals and restoration of native species. National Wildlife Refuges are mandated to provide good management of wildlife habitat. In this regard, eradication of noxious weed invasions and restoration of riparian/wetland systems are vital to the management goals of the USFWS. Staff funding is required to accomplish these necessary restoration activities.

No Action Yes |__| No |_X_| Rationale for answer: No action assures the continuation of decreasing habitat quality and quantity. Increased presence of noxious weeds will reduce opportunities for native plant succession, increase fire occurrence, and continue to lower refuge value for wildlife habitat. Wetlands and riparian habitat will continue a downward trend in providing needed foraging/nesting/rearing conditions for fish and wildlife. The inevitable consequence of no action will be the continuing decrease of productive habitat and a wildlife refuge that does not function.

Alternative(s) Yes | X__| No |__| Rationale for answer: An alternative would include providing several years (growing seasons) to carry out the above mentioned proposed actions.

2. Is the probability of success of the proposed action, alternatives or no action acceptable given their costs?

Proposed Action Yes |_X_| No |__| Rationale for answer: Contract costs have increased due to increased fuel and material costs. But the no action alternative only provides assurance of a rapidly declining environment accompanied by future increased costs of operation.

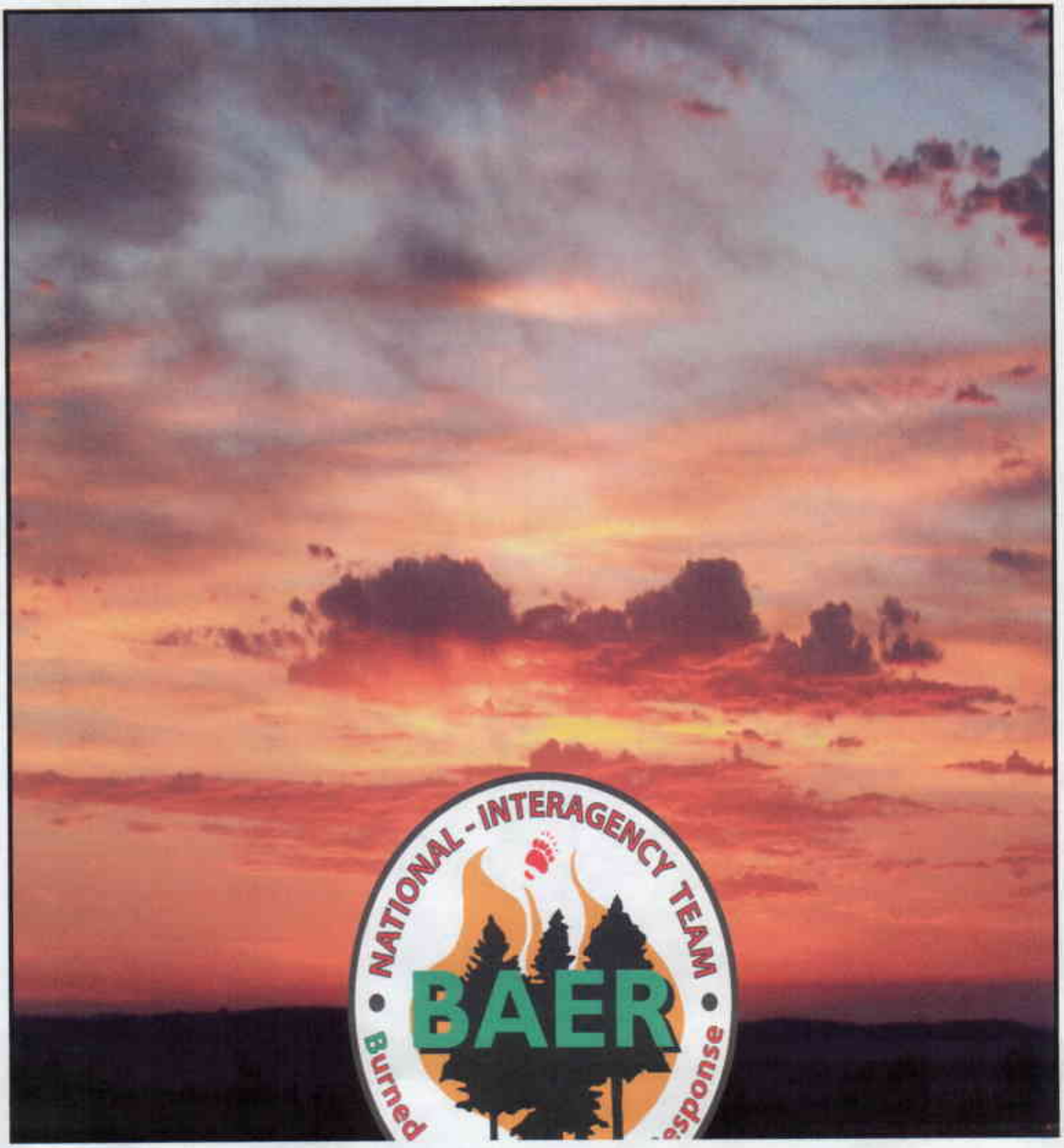
No Action Yes |__| No |_X_| Rationale for answer: See above.

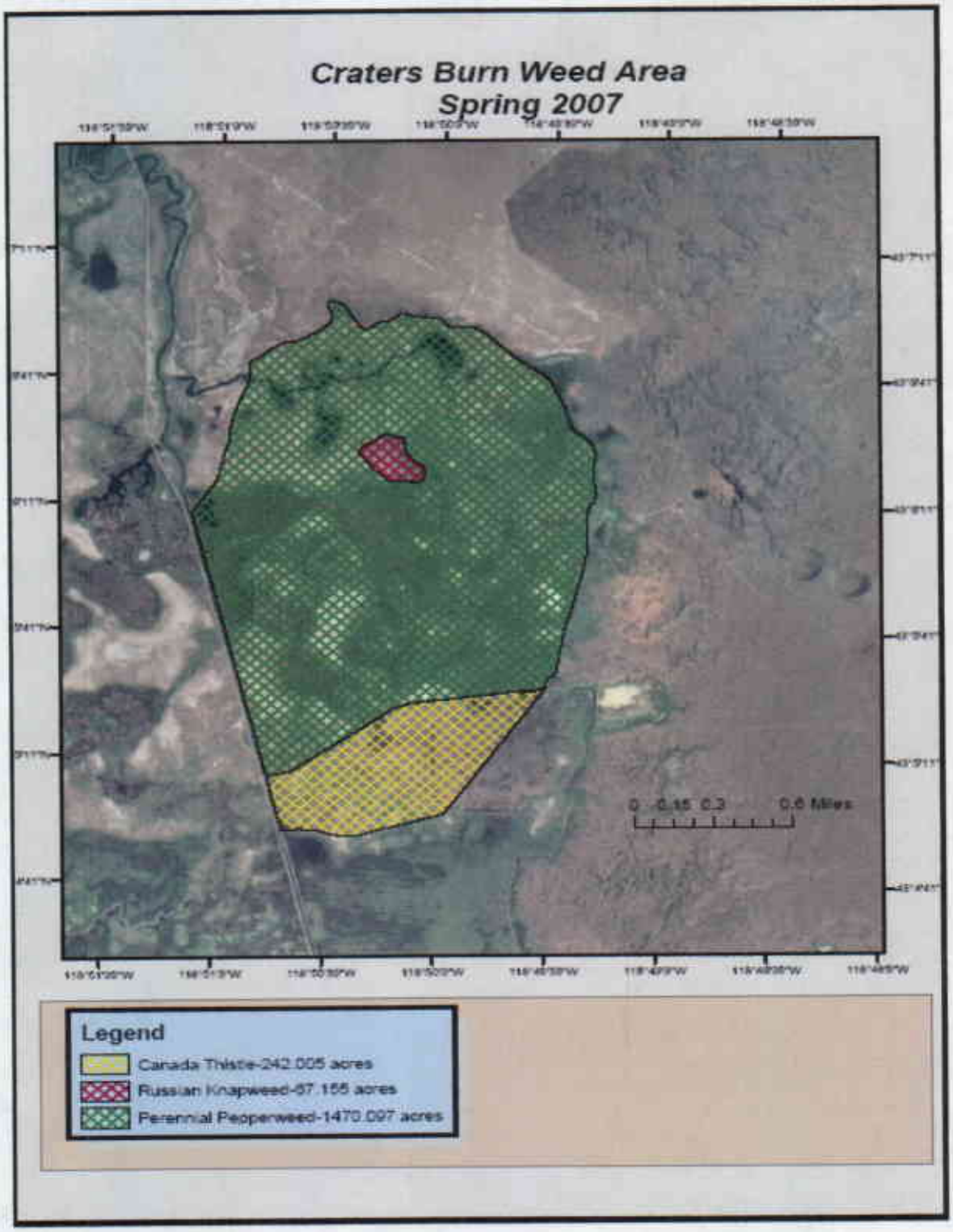
Alternative(s) Yes |_X_| No |__| Rationale for answer: Increase outreach opportunities for contracts/contractors.

3. Which approach will most cost-effectively and successfully attain the BAER objectives and therefore is recommended for implementation from a Cost/Risk Analysis standpoint?

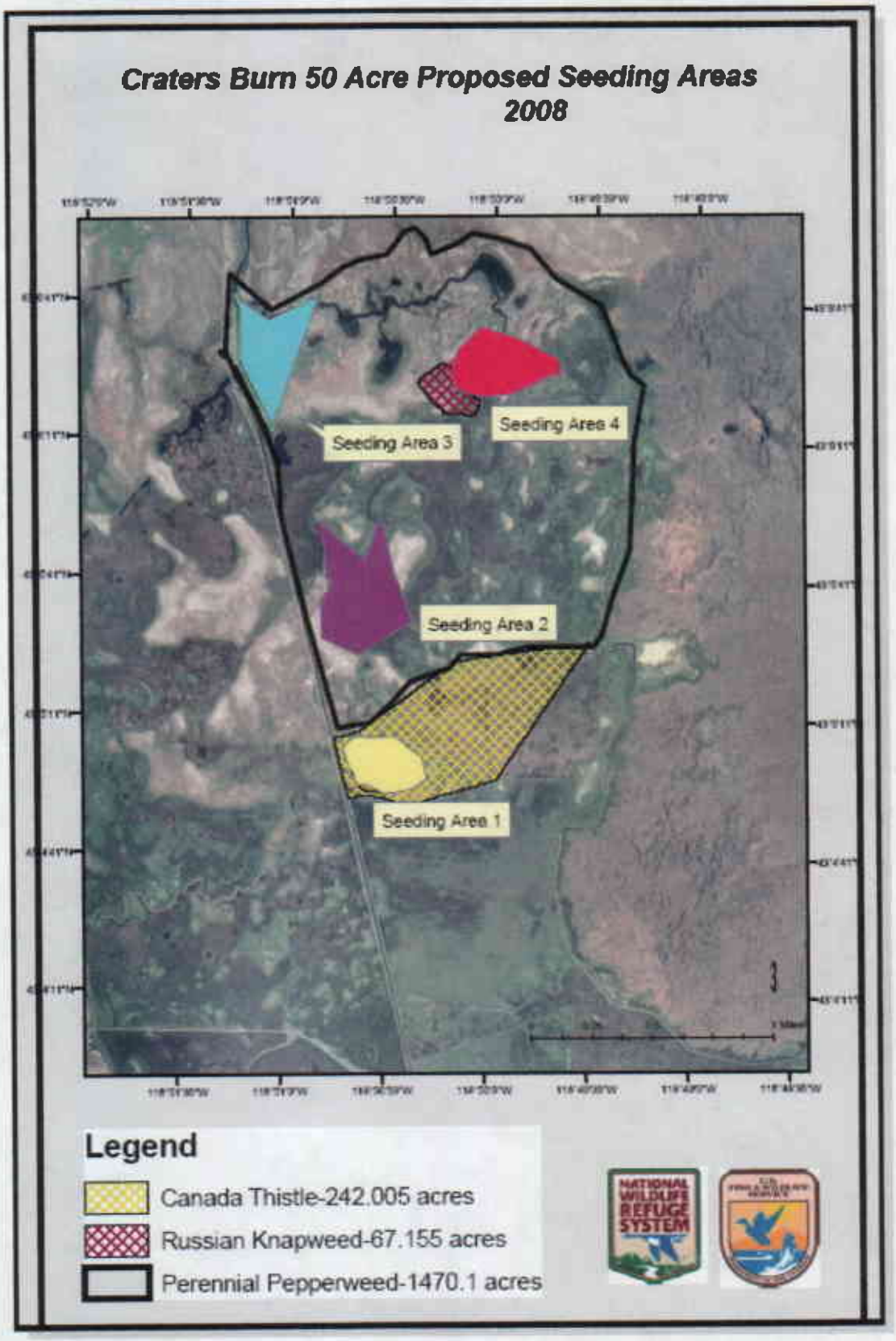
Proposed Action |_X_|, Alternative(s) |__|, or No Action |__|

APPENDIX I – GPS MAPS – COMPLETED ACTIVITIES/ TREATMENTS
FY- 2007 AND PROPOSED 2008 ACTIVITIES

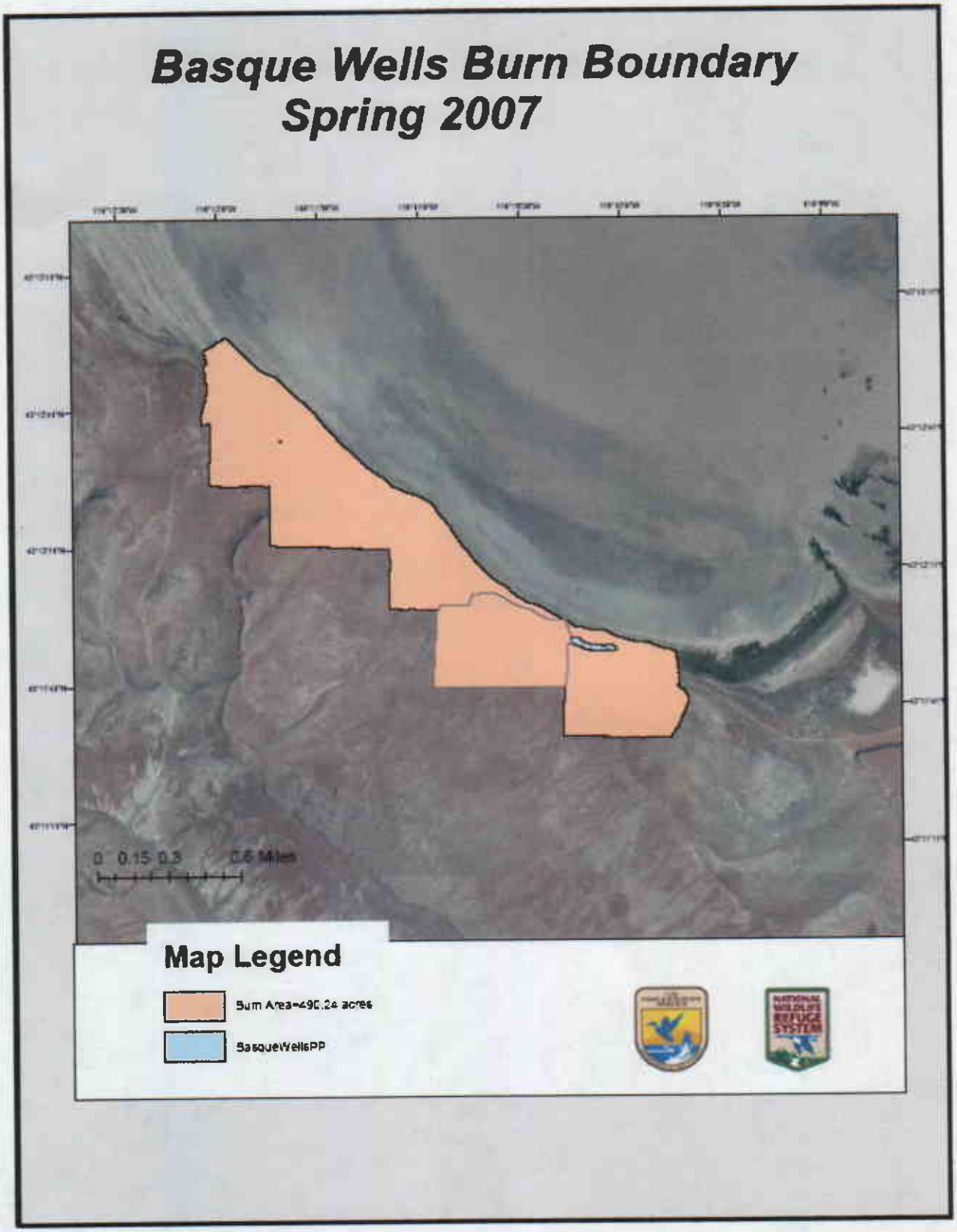



Craters Burn Weed Area
Spring 2007
0 0.15 0.3 0.6 Miles
Legend
Canada Thistle-242.005 acres
Russian Knapweed-67.156 acres
Perennial Peppenweed-1470.097 acres

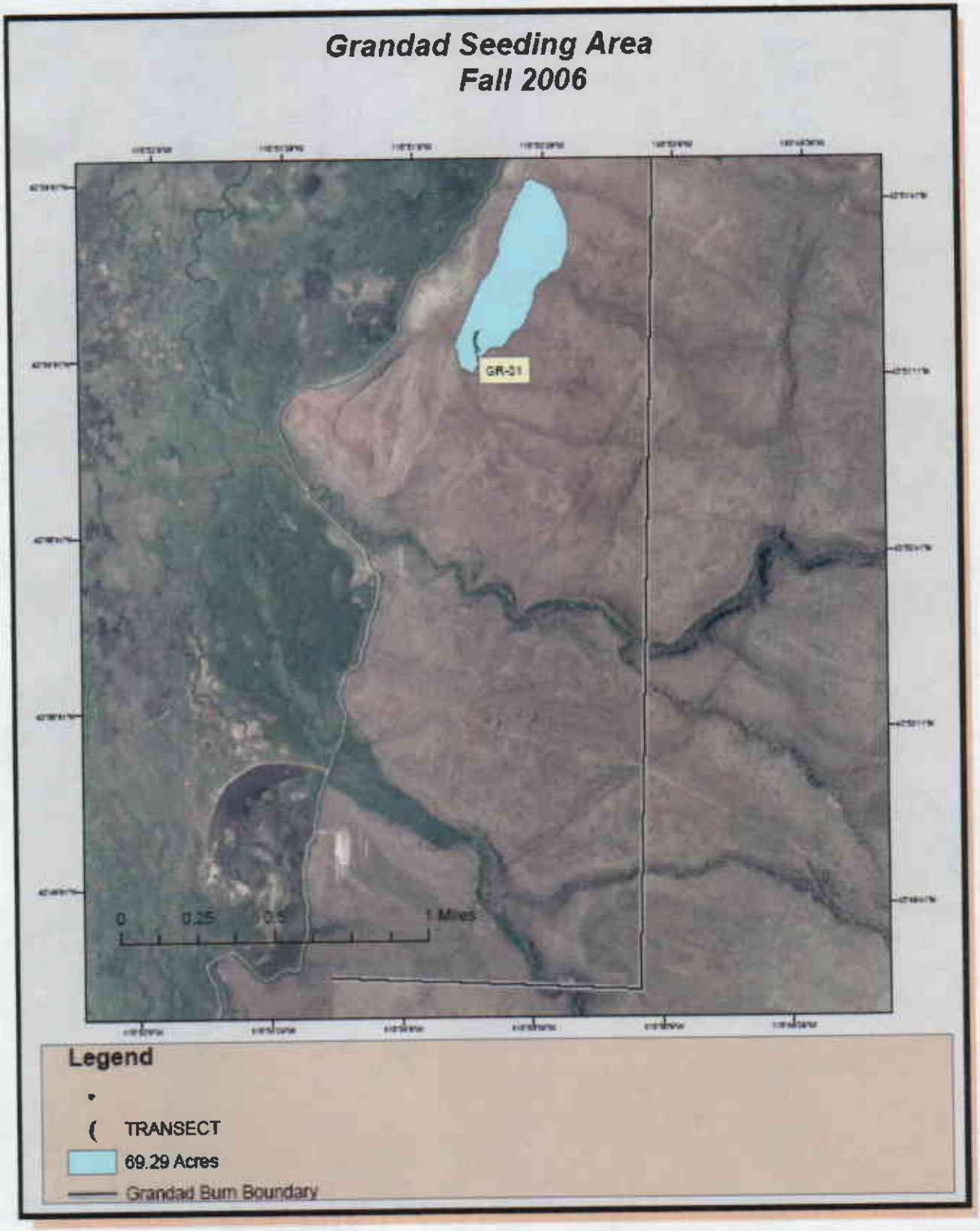
MUD CREEK SVAP EVALUATION, JUNE, 2007


Craters Burn 50 Acre Proposed Seeding Areas
2008
Seeding Area 3
Seeding Area 4
Seeding Area 2
Seeding Area 1
Legend
Canada Thistle-242.005 acres
Russian Knapweed-67.155 acres
Perennial Pepperweed-1470.1 acres
NATIONAL WILDLIFE REFUGE SYSTEM

MUD CREEK PROPOSED SEEDING AREAS
2008


Basque Wells Burn Boundary
Spring 2007
0 0.15 0.3 0.6 Miles
Map Legend
Burn Area=490.24 acres
BasqueWellsPP

Mud Creek Perennial Pepperweed and Canada Thistle Acreage
Spring 2007


Grandad Seeding Area
Fall 2006
GR-01
0
0.25
0.5
1 Miles
Legend
TRANSECT
69.29 Acres
Grandad Burn Boundary

Bridge Creek Perennial Pepperweed Acreage
Spring 2007

Legend

285.49 Acres

Grandad Burn Boundary

APPENDIX II - PHOTO DOCUMENTATION OF 2006 BURN & 2007 ACTIVITIES

JUNE, 2007 MUD CREEK SURVEY WITH CHRIS HOAG, NRCS

JULY 2007 REPLACING FIRE DAMAGED BOUNDARY SIGNS

MUD CREEK BURN, AUGUST, 2006
PHOTO, MAY 2007

CANADA THISTLE INVADING BURN SITE, GRANDAD FIRE PHOTO, MAY, 2007

TRIBUTARY TO MUD CREEK
PHOTO, MAY 2007

DOGWOOD AND WILLOW BURN AREAS, MUD CREEK

BRIDGE CREEK, MAY 2007

INVASION OF CANADA THISTLE IN BURN AREA, BRIDGE CREEK, MAY, 2007

MUD CREEK, JUNE 12, 2007

RUSSIAN KNAPWEED MONITORING SITE, CRATERS BURN, JUNE, 2007

PERENNIAL PEPPERWEED IN MUD CREEK DRAINAGE

IMPLEMENTATION LEADER AT WORK

BURNED AREA EMERGENCY STABILIZATION PLAN

SOUTH END COMPLEX
and
BASQUE WELLS & CRATERS FIRES

APPENDIX III - BURNED AREA ASSESSMENT REPORTS

- **SOIL & WATERSHED RESOURCE ASSESSMENT**
- **VEGETATION RESOURCE ASSESSMENT**
- **WILDLIFE RESOURCE ASSESSMENT**
- **CULTURAL RESOURCE ASSESSMENT**

- Soil & Watershed Damage Assessment Report

Basque Wells Fire

The watershed group assessed the 7,202 acres (370 FWS) Basque Wells Fire on September 2, 2006 by aerial reconnaissance to determine threats to human life or property from fire effects resulting in increased runoff, erosion or dust. This was followed by a field visit on September 4th. The Basque Wells fire lies adjacent to the southwest shore of Harney Lake. Soil burn severity mapping indicates 77.4% of the burn to be low, 7.3% moderate, with the remaining 15.3% to be very low or unburned. Soil erosion hazards for this area are slight, although the soil appeared to be fine-grained, perhaps remnants of an ancient lake bed. No defined channels were noted; drainages are ephemeral within the burn area. No increase in watershed response is expected. Prevailing winds are southwesterly; wind erosion may slightly increase blowing ash and dust until vegetation recovers. Suppression forces used the Malheur National Wildlife Refuge access road into the fire, and the watershed group observed ruts and holes in the shoulder of the road along the shores of Harney Lake.

Values at Risk:

Human Health & Safety: No threats to human life or safety from watershed response to the fire were identified.
Soil/Watershed Stabilization: Slight soil erosion may occur due to wind and water erosion until vegetation recovers.
T&E Habitat Stabilization/Recovery: No findings for this category
Cultural Heritage Resources: No findings for this category
Invasive Plants: No findings for this category

Craters Fire

The watershed group assessed the 10,767 acre (2,054 FWS) Craters Fire on September 4, 2006 by a field reconnaissance to determine threats to human life or property from fire effects resulting in increased runoff, erosion or dust. The Craters Fire lies adjacent to and within the Malheur National Wildlife Refuge and Diamond Craters geologic area. Soil burn severity mapping indicate 60% of the fire to be low, 11% moderate, 2% high, with the remaining 27% to be very low or unburned. The majority of the soils within the fire area range from very deep to very shallow and are located on basalt flows, rock outcrop, pressure ridges, hills and tablelands. Erosion potential for both water and wind is low to medium. There are no perennial streams in the fire area however, one intermittent stream does occur, Diamond Creek. This stream flows from south to north through the western portion of the fire area and eventually enters the Blitzen River. The topography is very flat therefore; no increase in watershed response is expected. Prevailing winds are southwesterly; wind erosion may slightly increase blowing ash and dust until vegetation recovers.

Values at Risk:

Human Health & Safety: No findings for this category.
Soil/Watershed Stabilization: Slight soil erosion may occur due to wind and water erosion until vegetation recovers.
T&E Habitat Stabilization/Recovery: No findings for this category.
Cultural Heritage Resources: No findings for this category.
Invasive Plants: No findings for this category.

MUD CREEK, MAY, 2007

Grandad Fire

The watershed group assessed the 46,595 acre (1,535 FWS) Grandad Fire on September 1 and September 7, 2006 by aerial reconnaissance to determine threats to human life or property from fire effects manifested in increased runoff, erosion or dust. This was followed by field visits on September 3rd, 4th, and 7th. The Grandad Fire lies adjacent to and within the Malheur National Wildlife Refuge. The Blitzen River is just outside the western fire boundary. Soil burn severity mapping indicates 47% of the fire to be low, 7% moderate, with the remaining 46% to be very low or unburned. Soils within the fire area range from very deep to shallow and are located on hills, pediments, mountainsides, fan terraces, old lake terraces, alluvial fans and tablelands. Erosion potential for both water and wind is medium to low. Prevailing winds are southwesterly; wind erosion may result in a significant increase in blowing ash and dust until vegetation recovers. Flushes of ash and sediment may occur during the first year following the fire. Bridge and Mud Creeks are the only perennial streams in the fire area and are tributaries to the Blitzen River after flowing through the East Canal. Both of these drainages have several ephemeral tributary streams within the burn area. The elevations of the burned areas range from 4255 to 7185 feet asl. The majority of the moderate burn severity occurred in the higher elevations of Bridge Creek watershed and near the mouth of Mud Creek.

Because most of the burned vegetation was shrub and grass and not trees, the fire will have

only minor effects to rain on snow runoff. Such events will continue to occur but the fire will not change the intensity or frequency of rain on snow runoff. The overall relative water yield increase due to the fire is expected to be minor and not exacerbate flooding events from spring snowmelt. The fire will only slightly increase surface runoff and stream flows generated from intense spring and summer rain storms over the Bridge Creek watershed. Flows will remain within the normal range of peak flows so risk of flooding from fire effects is minimal. Detailed peak flow predictions can be found in the project file.

Values at Risk:
Human Health & Safety: No findings for this category.
Soil/Watershed Stabilization: Soil erosion may occur due to wind and water erosion until vegetation recovers. Initial flushes of ash and sediment from Mud and Bridge Creek may result in the need for additional monitoring and cleaning of irrigation infrastructure. Localized increases in sediment delivery below moderate burn severity areas will result in filling of existing catchment basins.
T&E Habitat Stabilization/Recovery: No findings for this category.
Cultural Heritage Resources: No findings for this category.
Invasive Plants: No findings for this category.

Krumbo Butte Fire
The 804 acre Krumbo Butte Fire was assessed September 2, 2006 by aerial reconnaissance by the vegetation group. Riparian vegetation along Krumbo Creek and an unnamed drainage was unburned and intact and will filter any effects from the fire. Soil burn severity mapping indicates 81% of the burn area is of low severity, 4.5% of the area is moderate, and the remaining 14.5% is unburned. No off-site or downstream effects are expected.

- Vegetation Damage Assessment Report

The following vegetative resources have significant physical and biological value to protect soils, stabilize watersheds, provide wildlife habitat, scenic value, and forage for livestock and wild horses.

1. Mixed Salt Desert Scrub (Sacrobatus, Chrysothamnus Shrub Communities)

A. Intermountain Basins Greasewood Flat

Less than one percent of the total area burned was dominated by Salt Desert Plant Communities. Black greasewood (Sarcobatus vermiculatis) is typically the dominant shrubby plant on these areas. It is considered distinct from salt desert scrub communities, but often occurs on saline soils and around playas. This vegetation type was found primarily on the Craters and Basque Wells fires. Periodic burning was rare in these communities prior to the introduction of cheatgrass and other annual plants. Currently, introduced annual plants fill interspaces between the shrubs and increased the fuel continuity on the site. Fires burn more readily than before introduction of the annuals. Many of the plants that occur in these plant communities are not adapted to periodic burning. The black greasewood plant communities are often transition areas from playas to

lower elevation Wyoming big sagebrush (Artemisia tridentata ssp. wyomingensis) plant communities. Because it is a transition area there are often components of both sagebrush and salt desert plant communities scattered throughout. Other shrubs that may be found in the black greasewood plant communities are shadscale (Atriplex confertifolia), bud sage (Picrothamnus desertorum), spiny hopsage (Grayia spinosa) and fourwing saltbrush (Atriplex canescens). Saltgrass (Distichlis spicata) is the dominant grass in these communities. Other grasses may included Indian ricegrass (Achnatherum hymenoides), basin wildrye (Leymus cinereus), and bottlebrush squirreltail (Elymus elymoides).

2. Sagebrush Dominated Communities

Introduced sagebrush still dominates the plant communities across 77% of the area prior to burning.

A. Wyoming and Basin Big Sagebrush Plant communities

This type is dominated by basin big sagebrush (Artemesia tridentata var. tridentata) or Wyoming big sagebrush (Artemesia tridentata var. wyomingensis). Other shrubs that are present but not dominant include rubber rabbitbrush (Ericameria nauseosa), green rabbitbrush (Chrysothamnus viscidiflorus) antelope bitterbrush (Purshia tridentata), spineless horsebrush (Tetradymia canescens) and black greasewood (Sarcobatus vermiculatis). Perennial herbaceous species make up less than 25% cover. Grass Species include bluebunch wheatgrass (Pseudoroegneria spicata), Thurber's needlegrass (Achnatherum thruberiania), Sandberg's bluegrass (Poa secunda), basin wildrye (Leymus cinereus), bottlebrush squirreltail and western wheatgrass (Pascopyrum smithii). Creeping wild rye often fills this niche here. These sagebrush plant communities occupy the drier end of the sagebrush distribution across the Burns District. Cheatgrass (Bromus tectorum) has established, and now dominates the herbaceous vegetation, in large areas of these plant communities.

B. Mountain Big Sagebrush Plant Communities

Big sagebrush plant communities above approximately 5,000 feet are dominated by mountain big sagebrush (Artemisia tridentata ssp. vaseyana). These sagebrush plant communities are some of the most productive plant communities within the Burns District. A number of other shrubs are often found with in the mountain big sagebrush plant communities. The most common shrubs associated with mountain big sagebrush are antelope bitterbrush, mountain snowberry (Symphoricarpus oreophilus), wax currant (Ribes cereum), green rabbitbrush, and snowbrush ceanothus (Ceanothus velutinus). Bluebunch wheatgrass, Idaho fescue (Festuca idahoensis), Thurber's needlegrass, western needlegrass (Achnatherum occidentalis), Sandberg's bluegrass, and junegrass (Koleria macrantha) are the dominant grasses. Fires historically burned more frequently in these areas than in the lower elevation sagebrush and low sagebrush plant communities. Fire return intervals varied from less than 20 years to over 35 years. Historic fires that burned through these plant communities were either fuel or wind-driven events.

C. Western juniper (Juniperus occidentalis) has increased dramatically within the mountain big associated woody vegetation. On deeper soils western juniper will reduce the mountain big sagebrush and other shrub cover to less than 2%. Herbaceous vegetation is not as dramatically affected as the shrubs which are affected first. Herbaceous plant cover will decline to slightly

higher than pre-western juniper encroachment levels. However, on deeper soils western juniper will reduce all associated plant cover to less than 5%.

D. Low Sagebrush Plant Communities

Low sagebrush (Artemisia arbuscula) plant communities are found on shallow soils or soils with a heavy clay layer within 16 inches of the soil surface. Less than 25% of the total area burned by the fires were low sagebrush plant communities. Antelope bitterbrush, rubber rabbitbrush, and green rabbitbrush often found in association with low sagebrush. These larger shrubs are often found on slightly deeper soil islands within the low sagebrush plant community. Herbaceous vegetation is similar to the neighboring Wyoming or mountain big sagebrush plant communities. Sandberg's bluegrass, bluebunch wheatgrass, bottlebrush squirreltail and Idaho fescue are the dominant perennial grasses. Western juniper is also encroaching on low sagebrush plant communities. In many cases the encroaching western juniper is found in areas where no old western juniper trees had existed.

3. Quaking Aspen Woodlands

Quaking aspen (Populus tremuloides) is found on the higher elevations of the Burns District. Quaking aspen is often found in association with mountain big sagebrush or riparian plant communities. Soils are often deep and very productive. Areas where quaking aspen occurred made up about 3% of the total area burned. Quaking aspen plant communities usually respond very well to burning. Most of the plants sprout from subterranean structures that survive the fire. The vegetation occurs in a multilayered mixture of shrubs, forbs, and grasses. Common grasses are bluebunch wheatgrass, western needlegrass, basin wildrye, and mountain brome (Bromus marginatus). Forbs include Thalicturm sp., geranium, bedstraw (Galium sp.), peavine (Vicia sp.), and yarrow (Achillia milefolium).

4. Riparian and Wetlands

Less than 1% of the burned area were classified as riparian vegetation. However, these areas are extremely important to the overall ecology of the Burns District. Fire is a rare event in riparian areas due to the abundance of surface and subsurface water. When burned the effects can be dramatic. Woody vegetation within the riparian areas was dominated by willow (Salix sp.), and red alder (Alnus rubra). Cocarpus ledifolius occurs on rocky sites where it is protected from fire. Common co-occurring shrub components include sagebrush (Artemesia tridentata), snowberry (Symphorocarpos ssp.), Antelope bitterbrush (Purshia tridentata), and gooseberry (Ribes ssp.). Few areas were dominated by black cottonwood (Populus balsamifera).

5. Herbaceous Communities

A. Invasive Annual Grassland

This type is dominated by exotic annual grasses such as cheatgrass (Bromus tectorum). Areas dominated by cheatgrass occur on previously burned areas that were not reseeded following the burn.

B. Introduced Perennial Grassland

This type consists of perennial grasses of non-native origin, including Crested wheatgrass (Agropyron cristatum). The majority of these areas were once dominated by Wyoming or basin big sagebrush. On many of the seedings, Wyoming sagebrush is re-establishing itself.

Table 1. Acres of Vegetation Types by Ownership by Fire

Fire Name	Vegetation Association	MNWR	BLM	Private	Grand Total
Basque Wells	Mixed Salt Desert Scrub	4	531		535
	Other	358	0		358
	Sagebrush Dominated Communities	8	5,909	392	6309
Total		370	6,440	392	7,202
Craters	Sagebrush Dominated Communities	9	4,180	408	4,597
	Riparian and Wetlands	3	8	40	51
	Other (rock outcrops, lava beds)	2,042	3,867	210	6,119
Total		2,054	8,055	658	10,767
Grandad	Quaking Aspen Woodlands		4,433	7,471	11,904
	Sagebrush Dominated Communities	1,442	28,203	4,946	34,591
	Other	92	7		99
Total		1,535	32,643	12,417	46,594
Krumbo Butte	Sagebrush Dominated Communities	211	525	69	805
Total		211	525	69	805
Grand Total		4,170	47,663	13,535	65,368

- Wildlife Damage Assessment Report

Biological Assessment for Federally Listed Species

Direct effects as described in this report refer to individual mortality, or disturbance that results in flushing, displacement, or harassment of the animal. Indirect effects refer to modification of habitat and/or prey species and possible affects to the species.

Columbia Spotted Frog:

The Columbia spotted frog is a Federal Candidate Species know to occur in the lower end of Mud Creek, within the perimeter of the Grandad Fire, on both Malheur NWR and Burns BLM District lands. One CSF was detected in each of two surveys in 2002 and 2003 on Refuge lands on the lower end of Bridge Creek. This location was outside the burn perimeter and not subject to downstream effects, therefore it was not included in the fire effects analysis and emergency consultation process. The Steens Mountain populations are in the extreme southeastern extent of the CSF range (Bos and Sites 2001).

Anecdotal evidence suggests that CSF are common and often abundant in many areas of intermountain west (Idaho, western Montana, eastern Oregon, and northwest Wyoming). However, recent surveys in eastern Oregon suggest that CSF are rare, populations are small, and some declines may have occurred (Wente and Adams 2002). In the area encompassing the fires (Harney County), only five locations are known, supporting two to three populations (M. Adams, USGS, Corvalis, OR, unpub. data).

Generally, CSF inhabit pooled or flowing wetlands and moist meadows with floating and/or emergent vegetation. The Mud Creek population makes use of pools in the perennial creek and moist meadows on the flat delta near the mouth (R. Roy, USFWS, Malheur NWR, pers. comm.). Seasonal migrations are common if site conditions are unsuitable for all life history requirements (breeding, aestivation, winter hibernation, etc.), and can be greater than 2 km (Bull and Hayes 2001). CSF are generalist and opportunistic feeders with primary foods items including insects, arachnids, and mollusks (Whitaker et al. 1983).

The connectivity of populations of CSF within and adjacent to the fires is unknown. Further studies, outside the scope of this assessment, are needed to determine if each location represents an isolated population or if all are connected within a larger metapopulation structure.

Pooled water, springs, and floating and/or emergent vegetation are critical components for persistence of CSF in an area. Any stochastic event or land use practice that has a negative impact on these landscape elements poses a threat to CSF populations (Maxwell 2000, Engle 2001). A high proportion of the vegetation in known locations of Mud Creek was removed by the fire. This, coupled with other fire effects (e.g. increased sediment, ash, and flow), may result in impacts to CSF population within the fire area.

DIRECT EFFECTS: It is known that CSF occurred within the area at the time of the fire. The fine fuels at the mouth of Mud Creek were consumed quickly and the fire front likely moved through the area rapidly. Because these fuels were consumed quickly, there is little heating of the soil or water. Individuals that were in Mud Creek, or able to reach it before the flame front arrived, likely survived. This was supported by the detection of a CSF during post fire surveys by a BAER Team member. This detection was made with limited survey time (3-4 person hours), indicating that more CSF are likely still present in the area. A water temperature probe on Mud Creek showed that temperatures did not increase during the period of the fire. Also, numerous Great Basin redband trout and aquatic invertebrates were detected in Mud Creek during ground reconnaissance of the area. These findings further support the theory that individuals within the creek likely survived.

However, individuals which were in meadow areas or in vegetation adjacent to the creek may have been overcome by flames or smoke. While fine fuels do not burn intensely, they support moderate to high rates of spread. Individuals at greater distances from refuge would experience higher mortality, as their lack of mobility in vegetation would make it difficult to reach the creek. Researchers conducted surveys in Mud Creek and determined the presence of CSF, however they were not able to generate estimates of relative abundance. Because of this, it is difficult to determine the level of direct effects to this population.

INDIRECT EFFECTS: Approximately 95% of the vegetation in the area inhabited by CSF experienced moderate-high or high mortality. In contrast, approximately 57% of the area experience moderate-high or high burn severity (Table 3). These results indicate that while much of vegetation was removed by the fire it will likely return quickly. Sedges and grass species in burned areas of Mud Creek were already 3-4 inches high 10 days after the fires passed.

Table 1. Acres of vegetation mortality (A) and burn severity (B) in the lower end of Mud Creek on the Grandad Fire inhabited by the Columbia spotted frog. Acreage includes FWS and BLM land.

A	Low (<25%)	Low-Mod (26-50%)	Mod-High (51-75%)	High (>75%)	Total
Vegetation Mortality	0.1	0	0.4	9.2	9.7

B	Unburned	Low	Moderate	High	Total
Burn Severity	0	4.2	5.1	0.4	9.7

The short-term loss of vegetation could negatively impact the CSF through an increase in predation and a decrease in the amount of thermal cover available. Reduction in the amount of creekside vegetation may increase water temperatures to critical levels for the survival of the CSF. However, most of the willows, rose, and chokecherry will quickly return. This, plus the fact that area air temperatures will likely drop as fall approaches, may help mitigate this impact.

A more serious indirect effect may be caused by higher sediment loads in the creek due to increased runoff. The loss of vegetation in the watershed will result in increased soil erosion and ash flows into the creek. This runoff could fill pools used by CSF and/or degrade water quality to point where the habitat becomes unsuitable. If the rate of runoff into Mud Creek is slow, CSF would be able to move out of Mud Creek and use East Canal to find more suitable areas.

Increased sediment loads could also negatively impact CSF prey species. Runoff could decrease prey species diversity and abundance, which may displace CSF if they are unable to meet energy requirements. This may be mitigated by the fact that CSF are generalist foragers. They are able to feed on numerous species present in the system, and would likely be able to shift foraging habits to abundant species.

Emergency stabilization efforts to reseed areas near Mud Creek (see BLM Specification 3 and

FWS Specification 2) and prevent runoff, will mitigate some of the indirect effects.

DIRECT FIRE SUPPRESSION EFFECTS: The only suppression activity in the Mud Creek area that could potentially impact the CSF was a fire retardant drop approximately 300 feet long on the south side of the drainage. Approximately 100 feet of this line has the potential to run-off into the creek. The other 200 feet will fall in the other direction, away from the creek and be buffered by a wide band of unburned vegetation. A small amount of the retardant may have entered the creek, as flecks of retardant were observed on a few patches of vegetation. The retardant used will become inert with exposure to UV light, and has been shown to have low toxicity to aquatic organisms (Astaris MSDS). Furthermore, a CSF and numerous redband trout and invertebrates were observed in the creek indicating that it is likely that contamination did not occur. The physical properties of the retardant, coupled with the construction of a cup trench and placement of straw waddles to catch any runoff (see Emergency Stabilization – Fire Suppression Repair section), will prevent any impacts to the creek and the CSF it supports. No dozer line or hand line was constructed in the Mud Creek area.

INDIRECT FIRE SUPPRESSION EFFECTS: If retardant entered the creek, potential prey could be affected. As described above, the retardant will break down in the presence of UV light and has been shown to be of low toxicity to aquatic organisms. In addition, a cup trench and straw waddles surrounding the retardant will prevent it from entering the creek. No dozer line or hand line was constructed in the Mud Creek area.

Other Species of Importance:

Greater sage-grouse is managed as a FWS "species of concern" and a BLM "sensitive species". Based on a 2003 spring survey, the Burns BLM district supports 6,500 sage-grouse (Hagen 2005). The loss of sagebrush habitat will displace some individuals, but a more serious concern may be invasion of burned areas by weeds such as cheatgrass. Once invasives are established it is difficult for sagebrush and native forbs to regenerate or sprout from seed and has been shown to increase fire return interval. Intensive weed management (see FWS Specification 4 and BLM Specification 5) will increase chances of sagebrush re-establishment.

Three leks on the Pueblo Fire were burned over, while one lek on the Grandad Fire were unburned or suffered only low (<25%) vegetation mortality. One lek in the Grandad Fire, which was active, burned completely. Low and Wyoming big sagebrush around this lek suffered high mortality. The long term viability of this lek is low due to the loss of cover around the lek, which is used for escape cover and roosting by breeding sage-grouse. Approximately 60% of sagebrush habitat that is utilized year round by sage-grouse suffered moderate-high or high vegetation mortality within fire perimeters (Table 4). Habitats with this classification are known to support sage-grouse populations. Conditional/Unknown sagebrush habitat classes are more marginal habitats that have the potential to support sage-grouse, though use has not been verified. This class suffered moderate-high or high vegetation mortality of 59% within fire perimeters (Table 4.). While open lek habitat will remain available, cover near leks used for nesting and rest areas has been significantly decreased. Rehabilitation should focus on sagebrush re-establishment, with intensive monitoring of recovering burn and treatment areas.

Table 2. Acres of vegetation mortality classes within year long and conditional/unknown sage-grouse habitat on South End Complex, Basque Wells, and Craters Fires. Acreage includes BLM, FWS, and private land.

Fire Name	Habitat	Low (<25%)	Low-Mod (26-50%)	Mod-High (51-75%)	High (>75%)	Total
Basque Wells	YL	0	0	0	0	0
	CU	1	0	0	0	1
Crater	YL	0	0	0	0	0
	CU	1,048	36	75	831	1,990
Grandad	YL	23,350	3,255	2,730	17,094	46,429
	CU	15	11	21	460	507
Krumbo	YL	71	64	133	526	794

YL = Year long, high quality sage-grouse habitat
CU = Conditional/unknown, potential sage-grouse habitat

Within fire perimeters, vegetation mortality to ungulate winter range habitat was moderate-high to high: 67% for mule deer, 41% for elk, and 94% for pronghorn (Table 5). While elk and pronghorn may be negatively impacted by the temporary loss of cover in winter and for fawning, they may benefit from the resulting increase in grass and forb forage species. The effects of the fire to mule deer within their winter range are mostly negative. Most of the area north of the Grandad Fire and some of the lower north side of this fire has been burned and/or sprayed in the past to reduce sagebrush in order to establish crested wheatgrass. Very little sagebrush has returned to this area so mule deer winter range was already limited in this area prior to the fire. It should be noted that the relatively high levels of vegetation mortality are temporary and restricted to a small proportion of each species winter range throughout Harney County and the Columbia plateau. The ability of these species to easily move large distances will allow them to meet their energetic and habitat needs with little added stress. Negative net energetic costs to individuals and the area population as a whole will likely be negligible.

Table 3. Acres of vegetation mortality classes within mule deer, elk, and pronghorn antelope habitat on the South End Complex, Basque Wells, and Craters Fires. Acreage includes BLM, FWS, and private land.

Fire Name	Species	Low (<25%)	Low-Mod (26-50%)	Mod-High (51-75%)	High (>75%)	Total
Basque Wells	Mule Deer	306	458	444	4,284	5,492
	Elk	0	0	0	0	0
	P. Antelope	0	0	0	0	0
Crater	Mule Deer	1,445	18	27	5,944	7,434
	Elk	0	0	0	0	0
	P. Antelope	0	0	0	0	0
Grandad	Mule Deer	0	0	0	0	0
	Elk	8,352	701	959	5,413	15,425
	P. Antelope	0	0	0	0	0
Krumbo Butte	Mule Deer	17,003	1,279	1,958	30,320	50,560
	Elk	0	0	0	0	0
	P. Antelope	0	0	0	0	0

Great Basin redband trout inhabit numerous streams, creeks, and lakes in eastern Oregon. They are a BLM "special status species" and a valued game species that is managed for by FWS, BLM, and ODFW. The Burns BLM District and Malheur NWR have over 1,200 miles of streams and creeks that contain redband trout. Approximately 2% of the lengths of these streams occurred within the fire area. Of those that occurred within the area of the fires, 51% experienced moderate-high or high vegetation mortality (Table 6). The redband trout that inhabit these creeks were probably not directly affected by the fires. A water temperature probe in Mud Creek did not show that temperatures increased during or immediately after the fire burned through the area. Should water temperatures increase, the effects may be buffered by the species tolerance of warmer waters compared to other salmonids (Gamperl 2003). A larger threat to redband trout is sediment and ash flows into creeks resulting in the filling of pools and increases in pH. The level of runoff into creeks is based on many parameters and is difficult to predict. Affected streams will likely only be temporarily impaired, and depending of the rate of run-off, most trout would be able to move into more suitable waters via the East Canal. Though redband may temporarily be extirpated from some fire affected areas, the small extent of creeks affected (2%), connectivity of local populations, and their mobility, will probably result in negligible effects to the redband trout population in fire areas and Harney County in general. Rehabilitation of stream side vegetation will help mitigate indirect fire effects by trapping sediment and buffering water temperatures through shading.

Table 4 Miles of Great Basin redband trout streams with different vegetation mortality classes on the South End Complex, Basque Wells, and Craters Fires. Mileage includes BLM, FWS, and private land.

Fire Name	Low (<25%)	Low-Mod (26-50%)	Mod-High (51-75%)	High (>75%)	Total
Basque Wells	0	0	0	0	0
Crater	0.1	0.1	0.3	3.5	4.0
Grandad	11.4	1.9	1.7	7.3	22.3
Krumbo Butte	0.7	0.3	0.3	1.9	3.2

Riparian areas within the fire perimeters represent a fraction of the affected habitats. However, their rarity underscores their importance to the numerous species they support. Riparian habitats are important to breeding neotropical migrant birds for nesting and brood rearing. Restoration of these habitats has been recognized by the Oregon Habitat Joint Venture and Partners in Flight as being critical to neotropical migratory bird conservation. Post fire monitoring conducted in Mud and Bridge creeks have determined that extensive rehabilitation of riparian habitats is warranted.

- Cultural Damage Assessment Report

Reconnaissance Methodology and Results

Archaeologist Carla Burnside attended the agency briefing on September 1, 2006 where agency personnel from the Bureau of Land Management and the US Fish and Wildlife Service presented their issues and concerns to the team. Cultural Resource staff and Law Enforcement staff stressed the potential for looting of cultural resources on all fires. The great driving distances between fires on the complex increases the potential for looting and vandalism of these sites.

Field visits were made over the next 4 days to the Basque Wells, Craters, Grandad and Pueblo Fires to observe the effects of the fires, post fire erosive agents and the potential for vandalism or looting in these remote areas. The Black Point and Trout Creek Fires were not included in the field visits as BLM has no known prehistoric or historic sites in these areas. The extensive travel distances limited the amount of field time necessary for site visits. Field observations include the potential for severe wind erosion on sites within the fire perimeters and immediately adjacent to the burned areas is high; water erosion may impact sites; wood elements present on historic sites were absent; and fire activity has impacted rock art sites.

Findings:
Concealing vegetation was removed by fire from 101 cultural resource sites within the fire perimeters. This increases the vulnerability of the surface of the sites to water and wind erosion. In similar soils on past fires in the area a considerable amount of wind erosion occurred on the surface of prehistoric sites. This is expected to occur on all prehistoric fires within the fire

perimeters until vegetation has recovered.

Significant wind erosion could also occur on 37 sites immediately adjacent to the fire perimeters as the denuded, blackened surfaces heat up and create large dust devils. These large dust devils were observed on the Pueblo and Grandad fires within the burned area and traveling a considerable distance across vegetated areas picking up soil as they traveled.

Table 1. Prehistoric and Historic Cultural Resources

Fire	USFWS Sites within Fire Perimeter	USFWS Sites adjacent to Fire Perimeter	BLM Sites within Fire Perimeter	BLM Sites adjacent to Fire Perimeter
Basque Wells	4	1	7	3
Craters	8 (1 historic)	0	1	0
Krumbo Butte	2 (1 historic)	0	0	0
Grandad	26 (4 historic)	0	9 (2 historic)	0
Total	40	1	17	3

Wind erosion and loss of vegetative cover will increase the visibility of artifacts on archaeological sites, increasing the potential for looting. Illegal collection of prehistoric and historic artifacts for monetary purposes or for pleasure is common in the area. The vast distances between fires and the remoteness of many cultural resource sites increases the opportunities for illegal collection and looting. Law enforcement staff from both agencies expressed concern about the potential for vandalism and looting of cultural resource sites. As was noted above the fire removed concealing vegetation at 90 prehistoric and 11 historic sites, making them more vulnerable to illegal collection and looting. Increased law enforcement patrols and monitoring of cultural resource sites should limit these impacts to prehistoric and historic sites at risk within the fire perimeters and immediately adjacent to the fire.

Sites located on BLM administered lands also may be at risk from damage by off-road-vehicles (ORV). "Direct damage occurred to many surface sites which were driven over by ORV's. Much of this happened without the recreationist being aware of the damage…In addition to these effects from recreational use of ORVs, the widespread availability of them as transportation has enabled collectors and pothunters to reach areas of the desert that had previously been of limited access" (Lyneis et al. 1980:14).

APPENDIX IV- ENVIRONMENTAL COMPLIANCE

Federal, State, and Private Lands Environmental Compliance Responsibilities

All projects proposed in the South End Complex & Basque Wells & Craters Fires Burned Area Rehabilitation Plan that are prescribed, funded, or implemented by Federal agencies on Federal,

State, or private lands are subject to compliance with the National Environmental Policy Act (NEPA) in accordance with the guidelines provided by the Council on Environmental Quality (CEQ) Regulations (40 CFR 1500-1508); Department of the Interior and US Fish and Wildlife Service, 1985 Malheur National Wildlife Refuge Master Plan. This Appendix documents the Burned area emergency response team considerations of NEPA compliance requirements for prescribed rehabilitation and monitoring actions described in this plan for all jurisdictions affected by the South End Complex & Basque Wells & Craters Fire.

Related Plans and Cumulative Impact Analysis

The South End Complex & Basque Wells & Craters Fires Burned Area Rehabilitation Plan was reviewed and it was determined that actions proposed within the boundary of the South End Complex & Basque Wells & Craters Fires are consistent with the management objectives established by the NEPA process. At present the Fish and Wildlife Service personnel are in the early stages of creating a Comprehensive Conservation Plan NEPA compliance process for the Malheur National Wildlife Refuge. Resources identified through the NEPA process are:
Soils
Air Quality
Water Quality
Vegetation Management
Fish-Wildlife
Migratory Birds
Special Status Species
Recreation
Public Education
Cultural Resources
Visual Resource Quality

Previous fires that have burned in the area prior to the South End Complex, Basque Wells, and Craters Fires have resulted in the loss of vegetative habitat that is critical to numerous species of wildlife. Invasive weeds, which were present in these areas prior to the fires, have significantly increased in percent cover and density following the fire. Stabilization and rehabilitation measures to control invasive weeds and re-seed fire affected areas have been conducted. These measures may have helped slow establishment of invasive weeds and allowed native shrubs, forbs, and grass species to recover. The additional loss of habitat due to the South End Complex, Basque Wells, and Craters Fires could result in cumulative impacts to riparian and upland habitat and the species it supports. These impacts will be lessened by the implementation of re-seeding, plantings, weed management, and hydrological stabilization treatments. Fires are not immediately adjacent to each other; therefore unburned habitat is interspersed within a mosaic of recovering burned areas of various ages. The unburned habitat, which represents the vast majority of habitat in the region, should provide adequate habitat for a host of species until other burned areas recover. Ungulate, migratory birds, and resident species which are displaced from burned areas, will likely make use of these areas. Those surviving Columbia Spotted frogs, known to occur in the lower end of Mud Creek, within the perimeter of the Grandad Fire will, however remain in the fire impacted area. Future recovery success of the CFS is unknown at present.

Cumulative Impact Analysis

Cumulative effects are the environmental impacts resulting from the incremental impacts of a proposed action when added to other past, present, and reasonably foreseeable future actions, both Federal and non-Federal. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time. The rehabilitation treatments for areas affected by the South End Complex & Basque Wells & Craters Fire, as proposed do not result in an intensity of impact (i.e. major ground disturbance, etc.) that would cumulatively constitute a significant impact on the quality of the environment. The treatments are consistent with the above jurisdictional management plans and associated environmental compliance documents and categorical exclusions listed below.

Applicable and Relevant Categorical Exclusions

The individual actions proposed in this plan for Noxious Weed Control, Riparian Restoration, Planting/Seeding, are Categorically Excluded from further Environmental Analysis as provided for in the Federal Register, Department of the Interior NEPA Determination Needed For Fire Management Activities, Categorical Exclusions, June 5, 2003 (Volume 68, # 108), Pages 33813-33824.

Statement of Compliance for the South End Complex & Basque Wells & Craters Fires Fire Burned Area Rehabilitation Plan.

This section documents consideration given to the requirements of specific environmental laws in the development of the South End Complex & Basque Wells & Craters Fires Burned Area Rehabilitation Plan. Specific consultations initiated or completed during development and implementation of this plan are also documented. The following executive orders and legislative acts have been reviewed as they apply to the South End Complex & Basque Wells & Craters Fires Burned Area Rehabilitation Plan:

- National Historic Preservation Art (NAPA).
- Executive Order ll988. Flood plain Management.
- Executive Order 11990. Protection of Wetlands.
- Executive Order 12372. Intergovernmental Review.
- Executive Order 12892. Federal Actions to Address Environmental Justice in Minority and Low-income Populations.
- Endangered Species Act.
- Secretarial Order 3127. Federal Contaminated
- Clean Water Act.
- Clean Air Act.

NEPA Checklist: If any of the following exception applies, the Burned Area Rehabilitation Plan cannot be Categorically Excluded and an Environmental Assessment (EA) is required.

(Yes) (No)

( ) (x) Adversely affect Public Health and Safety

( ) (x) Adversely affect historic or cultural resources, wilderness, wild and scenic rivers aquifers, prime farmlands, wetlands, floodplains, ecologically critical areas, or Natural Landmarks.

( ) (x) Have highly controversial environmental effects.

( ) (x) Have highly uncertain environmental effects or involve unique or unknown environmental risks.

( ) (x) Establish a precedent resulting in significant environmental effects.

) (x) Relates to other actions with individually insignificant but cumulatively significant environmental effects.

( ) (x) Adversely effects properties listed or eligible for listing in the National Register of Historic Places

( ) (x) Adversely affect a species listed or proposed to be listed as Threatened or Endangered.

( ) (x) Threaten to violate any laws or requirements imposted for the "protection of the environment" such as Executive Order 1 1 988 (Floodplain Management) or Executive Order 11990 (Protection of Wetlands).

National Historic Preservation Act

Ground Disturbance:

(x) None

( ) Ground disturbance did occur and an archeologist survey, required under section 110 of the NHPA will be prepared. A report will be prepared under contract as specified by the Burned Area Rehabilitation Plan.

A NHPA Clearance Form:

( ) Is required because the project may have affected a site that is eligible or on the national register. The clearance form is attached. SHPO has been consulted under Section 106 (see Cultural Resource Assessment, Appendix I).

(x) Is not required because the Burned Area Rehabilitation Plan has no potential to affect cultural resources (initial of cultural resource specialist).

Other Requirements

(Yes) (No)

( ) (x) Does the Burned Area Rehabilitation Plan have potential to affect any Native American uses? If so, consultation with affiliated tribes is needed.

( ) (x) Are any toxic chemicals, including pesticides or treated wood, proposed for use? If so, local agency integrated pest management specialists must be consulted.

I have reviewed the proposals in the South End Complex & Basque Wells & Craters Fires Burned Area Rehabilitation Plan in accordance with the criteria above and have determined that the proposed actions would not involve any significant environmental effect. Therefore it is categorically excluded from further environmental (NEPA) review and documentation. Burned area emergency response team technical specialists have completed necessary coordination and consultation to insure compliance with the National Historic Preservation Act, Endangered Species Act, Clean Water Act and other Federal, State and local environment review requirements.

Burned Area Emergency Response Team Environmental Protection Specialist Date

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Project Leader